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NR;  
User Equipment (UE) radio transmission and reception;  
Part 1: Range 1 Standalone  
(3GPP TS 38.101-1 version 17.18.0 Release 17)**



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# Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

In the present document, modal verbs have the following meanings:

- shall** indicates a mandatory requirement to do something
- shall not** indicates an interdiction (prohibition) to do something

The constructions "shall" and "shall not" are confined to the context of normative provisions, and do not appear in Technical Reports.

The constructions "must" and "must not" are not used as substitutes for "shall" and "shall not". Their use is avoided insofar as possible, and they are not used in a normative context except in a direct citation from an external, referenced, non-3GPP document, or so as to maintain continuity of style when extending or modifying the provisions of such a referenced document.

- should** indicates a recommendation to do something
- should not** indicates a recommendation not to do something
- may** indicates permission to do something
- need not** indicates permission not to do something

The construction "may not" is ambiguous and is not used in normative elements. The unambiguous constructions "might not" or "shall not" are used instead, depending upon the meaning intended.

- can** indicates that something is possible
- cannot** indicates that something is impossible

The constructions "can" and "cannot" are not substitutes for "may" and "need not".

- will** indicates that something is certain or expected to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document
- will not** indicates that something is certain or expected not to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document
- might** indicates a likelihood that something will happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

**might not** indicates a likelihood that something will not happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

In addition:

**is** (or any other verb in the indicative mood) indicates a statement of fact

**is not** (or any other negative verb in the indicative mood) indicates a statement of fact

The constructions "is" and "is not" do not indicate requirements.

---

# 1 Scope

The present document establishes the minimum RF requirements for NR User Equipment (UE) operating on frequency Range 1.

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# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.

For a specific reference, subsequent revisions do not apply.

For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document in the same Release as the present document.

- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] 3GPP TS 38.101-2: "NR; User Equipment (UE) radio transmission and reception; Part 2: Range 2 Standalone".
- [3] 3GPP TS 38.101-3: "NR; User Equipment (UE) radio transmission and reception; Part 3: Range 1 and Range 2 Interworking operation with other radios".
- [4] 3GPP TS 38.521-1: "NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: Range 1 Standalone".
- [5] Recommendation ITU-R M.1545: "Measurement uncertainty as it applies to test limits for the terrestrial component of International Mobile Telecommunications-2000".
- [6] 3GPP TS 38.211: "NR; Physical channels and modulation".
- [7] 3GPP TS 38.331: "Radio Resource Control (RRC) protocol specification".
- [8] 3GPP TS 38.213: "NR; Physical layer procedures for control".
- [9] ITU-R Recommendation SM.329-10, "Unwanted emissions in the spurious domain".
- [10] 3GPP TS 38.214: "NR; Physical layer procedures for data".
- [11] 3GPP TS 36.101: Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception;
- [12] ETSI TS 102 792: "Intelligent Transport Systems (ITS); Mitigation techniques to avoid interference between European CEN Dedicated Short Range Communication (CEN DSRC) equipment and Intelligent Transport Systems (ITS) operating in the 5 GHz frequency range".
- [13] 3GPP TS 38.133: "NR; Requirements for support of radio resource management".
- [14] 3GPP TS 37.213: "Physical layer procedures for shared spectrum channel access".
- [15] 3GPP TS 38.306: "NR; User Equipment (UE) radio access capabilities".
- [16] ECC Decision (20)02: "Harmonised use of the paired frequency bands 874.4-880.0 MHz and 919.4-925.0 MHz and of the unpaired frequency band 1900-1910 MHz for Railway Mobile Radio (RMR)"

## 3 Definitions, symbols and abbreviations

### 3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

**Aggregated Allocation Bandwidth:** Total bandwidth of all allocated RBs in a transmission occasion. Can be calculated for two aggregated CCs as  $L_{\text{CRB},1} * 12 * \text{SCS}_1 + L_{\text{CRB},2} * 12 * \text{SCS}_2$ .

**Aggregated Channel Bandwidth:** The RF bandwidth in which a UE transmits and receives multiple contiguously aggregated carriers.

**Carrier aggregation:** Aggregation of two or more component carriers in order to support wider transmission bandwidths.

**Carrier aggregation band:** A set of one or more operating bands across which multiple carriers are aggregated with a specific set of technical requirements.

**Carrier aggregation bandwidth class:** A class defined by the aggregated transmission bandwidth configuration and maximum number of component carriers supported by a UE.

**Carrier aggregation configuration:** A combination of CA operating band(s) and CA bandwidth class(es) supported by a UE.

**Concurrent operation:** The simultaneous transmission and reception of sidelink and Uu interfaces while operation is agnostic of the service used on each interface.

**Contiguous carriers:** A set of two or more carriers configured in a spectrum block where there are no RF requirements based on co-existence for un-coordinated operation within the spectrum block.

**Contiguous resource allocation:** A resource allocation of consecutive resource blocks within one carrier or across contiguously aggregated carriers. The gap between contiguously aggregated carriers due to the nominal channel spacing is allowed.

**Contiguous spectrum:** Spectrum consisting of a contiguous block of spectrum with no sub-block gaps.

**Inter-band carrier aggregation:** Carrier aggregation of component carriers in different operating bands.

NOTE: Carriers aggregated in each band can be contiguous or non-contiguous.

**Intra-band contiguous carrier aggregation:** Contiguous carriers aggregated in the same operating band.

**Intra-band non-contiguous carrier aggregation:** Non-contiguous carriers aggregated in the same operating band.

**Railway Mobile Radio:** railway operations encompassing GSM-R and its successor(s), including the Future Railway Mobile Communication System (FRMCS); in the context of this specification the Railway Mobile Radio is limited to NR operation in band n100, or n101.

**RedCap UE:** The UE with reduced capabilities as defined in clause 4.2.21.1 from TS38.306 [15].

**Sub-band:** For a UE that supports shared spectrum channel access in wideband operation, a sub-band is the set of RBs within an approximately 20 MHz segment of the channel where the wideband channel is uniformly divided into an integer number of 20 MHz sub-bands. Sub-bands may be separately allocated in uplink and downlink.

**Sub-block:** This is one contiguous allocated block of spectrum for transmission and reception by the same UE. There may be multiple instances of sub-blocks within an RF bandwidth.

**Sub-block bandwidth:** The bandwidth of one sub-block.

**Sub-block gap:** A frequency gap between two consecutive sub-blocks within an RF bandwidth, where the RF requirements in the gap are based on co-existence for un-coordinated operation.

**UE transmission bandwidth configuration:** Set of resource blocks located within the UE channel bandwidth which may be used for transmitting or receiving by the UE.

**Vehicular UE:** A UE embedded in a vehicle, permanently connected to an embedded antenna system that radiates externally for NR operating bands.

NOTE: Vehicular UE does not refer to other UE form factors placed inside the vehicle.

**Wideband operation:** For a UE that supports shared spectrum channel access, wideband operation refers to operation within a channel larger than 20 MHz in which intra-cell guard bands may be configured to distinguish individual RB-sets

## 3.2 Symbols

For the purposes of the present document, the following symbols apply:

|                                            |                                                                                                                                                                                       |
|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $\Delta F_{\text{Global}}$                 | Granularity of the global frequency raster                                                                                                                                            |
| $\Delta F_{\text{Raster}}$                 | Band dependent channel raster granularity                                                                                                                                             |
| $\Delta f_{\text{OOB}}$                    | $\Delta$ Frequency of Out Of Band emission                                                                                                                                            |
| $\Delta F_{\text{TX-RX}}$                  | Maximum deviation to the Tx-Rx carrier center frequency separation for asymmetric uplink/downlink channel bandwidth operation                                                         |
| $\Delta \text{MPR}_c$                      | Allowed Maximum Power Reduction relaxation for serving cell $c$                                                                                                                       |
| $\Delta P_{\text{PowerClass}}$             | Adjustment to maximum output power for a given power class                                                                                                                            |
| $\Delta_{\text{RB}}$                       | The starting frequency offset between the allocated RB and the measured non-allocated RB                                                                                              |
| $\Delta R_{\text{IB},c}$                   | Allowed reference sensitivity relaxation due to support for inter-band CA operation, for serving cell $c$                                                                             |
| $\Delta R_{\text{IBC}}$                    | Allowed reference sensitivity relaxation due to support for intra-band contiguous CA operation                                                                                        |
| $\Delta R_{\text{IBNC}}$                   | Allowed reference sensitivity relaxation due to support for intra-band non-contiguous CA operation                                                                                    |
| $\Delta R_{\text{IB},4R}$                  | Reference sensitivity adjustment due to support for 4 antenna ports                                                                                                                   |
| $\Delta R_{1R}$                            | Reference sensitivity adjustment due to support for 1 antenna ports                                                                                                                   |
| $\Delta_{\text{Shift}}$                    | Channel raster offset                                                                                                                                                                 |
| $\Delta T_C$                               | Allowed operating band edge transmission power relaxation                                                                                                                             |
| $\Delta T_{C,c}$                           | Allowed operating band edge transmission power relaxation for serving cell $c$                                                                                                        |
| $\Delta T_{\text{IB},c}$                   | Allowed maximum configured output power relaxation due to support for inter-band CA operation, inter-band NR-DC operation and due to support for SUL operations, for serving cell $c$ |
| $BW_{\text{Channel}}$                      | Channel bandwidth                                                                                                                                                                     |
| $BW_{\text{Channel},\text{block}}$         | Sub-block bandwidth, expressed in MHz. $BW_{\text{Channel},\text{block}} = F_{\text{edge},\text{block},\text{high}} - F_{\text{edge},\text{block},\text{low}}$                        |
| $BW_{\text{Channel\_CA}}$                  | Aggregated channel bandwidth, expressed in MHz                                                                                                                                        |
| $BW_{\text{Channel},\text{max}}$           | Maximum channel bandwidth supported among all bands in a release                                                                                                                      |
| $BW_{\text{GB}}$                           | $\max(BW_{\text{GB},\text{Channel}(k)})$                                                                                                                                              |
| $BW_{\text{GB},\text{Channel}(k)}$         | Minimum guard band defined in clause 5.3A.1 of carrier $k$                                                                                                                            |
| $BW_{\text{DL}}$                           | Channel bandwidth for DL                                                                                                                                                              |
| $BW_{\text{UL}}$                           | Channel bandwidth for UL                                                                                                                                                              |
| $BW_{\text{interferer}}$                   | Bandwidth of the interferer                                                                                                                                                           |
| $\text{Ceil}(x)$                           | Rounding upwards; $\text{ceil}(x)$ is the smallest integer such that $\text{ceil}(x) \geq x$                                                                                          |
| $\text{Floor}(x)$                          | Rounding downwards; $\text{floor}(x)$ is the greatest integer such that $\text{floor}(x) \leq x$                                                                                      |
| $F_C$                                      | Center frequency of a carrier for a numerology defined by the <i>RF reference frequency</i> on the channel raster mapped to the carrier according to sub-clause 5.4.2.2               |
| $F_{C,\text{block},\text{high}}$           | $F_C$ of the highest transmitted/received carrier in a <i>sub-block</i>                                                                                                               |
| $F_{C,\text{block},\text{low}}$            | $F_C$ of the lowest transmitted/received carrier in a <i>sub-block</i>                                                                                                                |
| $F_{C,\text{low}}$                         | The $F_C$ of the lowest carrier, expressed in MHz                                                                                                                                     |
| $F_{C,\text{high}}$                        | The $F_C$ of the highest carrier, expressed in MHz                                                                                                                                    |
| $F_{\text{DL},\text{low}}$                 | The lowest frequency of the downlink <i>operating band</i>                                                                                                                            |
| $F_{\text{DL},\text{high}}$                | The highest frequency of the downlink <i>operating band</i>                                                                                                                           |
| $F_{\text{UL},\text{low}}$                 | The lowest frequency of the uplink <i>operating band</i>                                                                                                                              |
| $F_{\text{UL},\text{high}}$                | The highest frequency of the uplink <i>operating band</i>                                                                                                                             |
| $F_{\text{edge},\text{block},\text{low}}$  | The lower <i>sub-block</i> edge, where $F_{\text{edge},\text{block},\text{low}} = F_{C,\text{block},\text{low}} - F_{\text{offset},\text{low}}$ .                                     |
| $F_{\text{edge},\text{block},\text{high}}$ | The upper <i>sub-block</i> edge, where $F_{\text{edge},\text{block},\text{high}} = F_{C,\text{block},\text{high}} + F_{\text{offset},\text{high}}$ .                                  |
| $F_{\text{edge},\text{low}}$               | The <i>lower edge of aggregated channel bandwidth</i> , expressed in MHz. $F_{\text{edge},\text{low}} = F_{C,\text{low}} - F_{\text{offset},\text{low}}$ .                            |
| $F_{\text{edge},\text{high}}$              | The <i>higher edge of aggregated channel bandwidth</i> , expressed in MHz. $F_{\text{edge},\text{high}} = F_{C,\text{high}} + F_{\text{offset},\text{high}}$ .                        |



|                                  |                                                                                                                                                                                                                                                                                                                                                   |
|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $F_{\text{Interferer}}$ (offset) | Frequency offset of the interferer (between the center frequency of the interferer and the carrier frequency of the carrier measured). For intra-band contiguous CA, the $F_{\text{Interferer}}$ (offset) is the frequency separation of the center frequency of the carrier closest to the interferer and the center frequency of the interferer |
| $F_{\text{Interferer}}$          | Frequency of the interferer                                                                                                                                                                                                                                                                                                                       |
| $F_{\text{offset}}$              | Frequency offset of the interferer (between the center frequency of the interferer and the closest edge of the carrier measured)                                                                                                                                                                                                                  |
| $F_{\text{offset,high}}$         | Frequency offset from $F_{C,\text{high}}$ to the <i>higher edge</i> or $F_{C,\text{low}}$ to the <i>lower edge</i> .                                                                                                                                                                                                                              |
| $F_{\text{offset,low}}$          | Frequency offset from $F_{C,\text{high}}$ to the upper <i>UE RF Bandwidth edge</i> , or from $F_{C,\text{block, high}}$ to the upper sub-block edge                                                                                                                                                                                               |
|                                  | Frequency offset from $F_{C,\text{low}}$ to the lower <i>UE RF Bandwidth edge</i> , or from $F_{C,\text{block, low}}$ to the lower sub-block edge                                                                                                                                                                                                 |
| $F_{\text{OOB}}$                 | The boundary between the NR out of band emission and spurious emission domains                                                                                                                                                                                                                                                                    |
| $F_{\text{REF}}$                 | RF reference frequency                                                                                                                                                                                                                                                                                                                            |
| $F_{\text{REF-Offs}}$            | Offset used for calculating $F_{\text{REF}}$                                                                                                                                                                                                                                                                                                      |
| $F_{\text{REF, shift}}$          | RF reference frequency for Supplementary Uplink (SUL) bands, the uplink of all FDD bands, and TDD bands                                                                                                                                                                                                                                           |
| $F_{\text{uw}}$ (offset)         | The frequency separation of the center frequency of the carrier closest to the interferer and the center frequency of the interferer                                                                                                                                                                                                              |
| $GB_{\text{Channel}}$            | Minimum guard band defined in clause 5.3.3, expressed in kHz                                                                                                                                                                                                                                                                                      |
| $G_{n100\text{post connector}}$  | Declared value of the post chipset unit antenna connector gain for band n100, used for conversion of the radiated requirement into a conducted requirement (see principles described in annex M)                                                                                                                                                  |
| $G_{n101\text{post connector}}$  | Declared value of the post chipset unit antenna connector gain for band n101, used for conversion of the radiated requirement into a conducted requirement (see principles described in annex M)                                                                                                                                                  |
| $L_{\text{CRB}}$                 | Transmission bandwidth which represents the length of a contiguous resource block allocation expressed in units of resources blocks                                                                                                                                                                                                               |
| $\text{Max}()$                   | The largest of given numbers                                                                                                                                                                                                                                                                                                                      |
| $\text{Min}()$                   | The smallest of given numbers                                                                                                                                                                                                                                                                                                                     |
| $n_{\text{PRB}}$                 | Physical resource block number                                                                                                                                                                                                                                                                                                                    |
| $NR_{\text{ACLR}}$               | NR ACLR                                                                                                                                                                                                                                                                                                                                           |
| $N_{\text{RB}}$                  | Transmission bandwidth configuration, expressed in units of resource blocks                                                                                                                                                                                                                                                                       |
| $N_{\text{RB\_agg}}$             | The number of the aggregated RBs within the fully allocated aggregated channel bandwidth<br>$N_{\text{RB\_agg}} = \sum_{i=1}^j N_{\text{RB}_i} * 2^{\mu_i} \text{ for carrier 1 to } j, \text{ where } \mu \text{ is defined in TS 38.211 [6]}$                                                                                                   |
| $N_{\text{RB},c}$                | The transmission bandwidth configuration of component carrier c, expressed in units of resource blocks<br>$N_{\text{RB},c,j} = N_{\text{RB}_j} * 2^{\mu_j} \text{ for carrier } j, \text{ where } \mu \text{ is defined in TS 38.211 [6]}$                                                                                                        |
| $N_{\text{RB,largest BW}}$       | The largest transmission bandwidth configuration of the component carriers in the bandwidth combination, expressed in units of resource blocks                                                                                                                                                                                                    |
| $N_{\text{RB,low}}$              | The transmission bandwidth configurations according to Table 5.3.2-1 for the lowest assigned component carrier in clause 5.3A.1                                                                                                                                                                                                                   |
| $N_{\text{RB,high}}$             | The transmission bandwidth configurations according to Table 5.3.2-1 for the highest assigned component carrier in clause 5.3A.1                                                                                                                                                                                                                  |
| $N_{\text{REF}}$                 | NR Absolute Radio Frequency Channel Number (NR-ARFCN)                                                                                                                                                                                                                                                                                             |
| $N_{\text{REF-Offs}}$            | Offset used for calculating $N_{\text{REF}}$                                                                                                                                                                                                                                                                                                      |
| $P_{\text{CMAX}}$                | The configured maximum UE output power                                                                                                                                                                                                                                                                                                            |
| $P_{\text{CMAX},c}$              | The configured maximum UE output power for serving cell c                                                                                                                                                                                                                                                                                         |
| $P_{\text{CMAX},f,c}$            | The configured maximum UE output power for carrier f of serving cell c in each slot                                                                                                                                                                                                                                                               |
| $P_{\text{EMAX}}$                | Maximum allowed UE output power signalled by higher layers                                                                                                                                                                                                                                                                                        |
| $P_{\text{EMAX},c}$              | Maximum allowed UE output power signalled by higher layers for serving cell c                                                                                                                                                                                                                                                                     |
| $P_{\text{Interferer}}$          | Modulated mean power of the interferer                                                                                                                                                                                                                                                                                                            |
| $P_{\text{largest BW}}$          | Power of the largest transmission bandwidth configuration of the component carriers in the bandwidth combination                                                                                                                                                                                                                                  |
| $P_{\text{PowerClass}}$          | The nominal UE power (i.e., no tolerance)                                                                                                                                                                                                                                                                                                         |
| $P\text{-MPR}_c$                 | Power Management Maximum Power Reduction for serving cell c                                                                                                                                                                                                                                                                                       |
| $P_{\text{RB}}$                  | The transmitted power per allocated RB, measured in dBm                                                                                                                                                                                                                                                                                           |
| $P_{\text{UMAX}}$                | The measured configured maximum UE output power                                                                                                                                                                                                                                                                                                   |
| $P_{\text{uw}}$                  | Power of an unwanted DL signal                                                                                                                                                                                                                                                                                                                    |
| $P_{\text{w}}$                   | Power of a wanted DL signal                                                                                                                                                                                                                                                                                                                       |
| $RB_{\text{start}}$              | The lowest RB index of transmitted resource blocks                                                                                                                                                                                                                                                                                                |
| $RB_{\text{start\_CA}}$          | The lowest RB index of transmitted resource blocks for intra-band contiguous CA                                                                                                                                                                                                                                                                   |

|                            |                                                                                                                                       |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| $SCS_c$                    | SCS for the component carrier $c$ , expressed in kHz                                                                                  |
| $SCS_{\text{largest BW}}$  | SCS for the largest transmission bandwidth configuration of the component carriers in the bandwidth combination, expressed in kHz     |
| $SCS_c$                    | SCS for the component carrier $c$ , expressed in kHz                                                                                  |
| $SCS_{\text{largest BW}}$  | SCS for the largest transmission bandwidth configuration of the component carriers in the bandwidth combination, expressed in kHz     |
| $tp$                       | Transient Period value signalled by the UE                                                                                            |
| $tp_{\text{start}}$        | Start position of transient period relative to the symbol boundary                                                                    |
| $T(P_{\text{CMAX}}, f, c)$ | Tolerance for applicable values of $P_{\text{CMAX}}, f, c$ for configured maximum UE output power for carrier $f$ of serving cell $c$ |
| $T_{L,c}$                  | Absolute value of the lower tolerance for the applicable <i>operating band</i> as specified in clause 6.2.1                           |
| $SS_{\text{REF}}$          | SS block reference frequency position                                                                                                 |
| $UTRA_{\text{ACLR}}$       | UTRA ACLR                                                                                                                             |

### 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

|            |                                                                                                                                                                                             |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ACLR       | Adjacent Channel Leakage Ratio                                                                                                                                                              |
| ACS        | Adjacent Channel Selectivity                                                                                                                                                                |
| A-MPR      | Additional Maximum Power Reduction                                                                                                                                                          |
| BS         | Base Station                                                                                                                                                                                |
| BW         | Bandwidth                                                                                                                                                                                   |
| BWP        | Bandwidth Part                                                                                                                                                                              |
| CA         | Carrier Aggregation                                                                                                                                                                         |
| CA_nX-nY   | Inter-band CA of component carrier(s) in one sub-block within Band nX and component carrier(s) in one sub-block within Band nY where nX and nY are the applicable NR <i>operating bands</i> |
| CC         | Component Carriers                                                                                                                                                                          |
| CG         | Carrier Group                                                                                                                                                                               |
| CP-OFDM    | Cyclic Prefix-OFDM                                                                                                                                                                          |
| CW         | Continuous Wave                                                                                                                                                                             |
| DC         | Dual Connectivity                                                                                                                                                                           |
| DFT-s-OFDM | Discrete Fourier Transform-spread-OFDM                                                                                                                                                      |
| DM-RS      | Demodulation Reference Signal                                                                                                                                                               |
| DTX        | Discontinuous Transmission                                                                                                                                                                  |
| E-UTRA     | Evolved UTRA                                                                                                                                                                                |
| EIRP       | Equivalent Isotropically Radiated Power                                                                                                                                                     |
| EVM        | Error Vector Magnitude                                                                                                                                                                      |
| FR         | Frequency Range                                                                                                                                                                             |
| FRMCS      | Future Railway Mobile Communication System                                                                                                                                                  |
| FRC        | Fixed Reference Channel                                                                                                                                                                     |
| FWA        | Fixed Wireless Access                                                                                                                                                                       |
| GSCN       | Global Synchronization Channel Number                                                                                                                                                       |
| IBB        | In-band Blocking                                                                                                                                                                            |
| IDFT       | Inverse Discrete Fourier Transformation                                                                                                                                                     |
| ITS        | Intelligent Transportation System                                                                                                                                                           |
| ITU-R      | Radiocommunication Sector of the International Telecommunication Union                                                                                                                      |
| MBW        | Measurement bandwidth                                                                                                                                                                       |
| MCG        | Master Cell Group                                                                                                                                                                           |
| MOP        | Maximum Output Power                                                                                                                                                                        |
| MPR        | Allowed maximum power reduction                                                                                                                                                             |
| MSD        | Maximum Sensitivity Degradation                                                                                                                                                             |
| NR         | New Radio                                                                                                                                                                                   |
| NR-ARFCN   | NR Absolute Radio Frequency Channel Number                                                                                                                                                  |
| NS         | Network Signalling                                                                                                                                                                          |
| OCNG       | OFDMA Channel Noise Generator                                                                                                                                                               |
| OOB        | Out-of-band                                                                                                                                                                                 |
| P-MPR      | Power Management Maximum Power Reduction                                                                                                                                                    |
| PRB        | Physical Resource Block                                                                                                                                                                     |

|         |                                             |
|---------|---------------------------------------------|
| PS      | Public Safety                               |
| PSCCH   | Physical Sidelink Control CHannel           |
| PSSCH   | Physical Sidelink Shared CHannel            |
| QAM     | Quadrature Amplitude Modulation             |
| RE      | Resource Element                            |
| REFSENS | Reference Sensitivity                       |
| RedCap  | Reduced Capability                          |
| RF      | Radio Frequency                             |
| RMS     | Root Mean Square (value)                    |
| RSRP    | Reference Signal Receiving PowerRx Receiver |
| Rx      | Receiver                                    |
| RMR     | Railway Mobile Radio                        |
| SC      | Single Carrier                              |
| SCG     | Secondary Cell Group                        |
| SCS     | Subcarrier spacing                          |
| SDL     | Supplementary Downlink                      |
| SEM     | Spectrum Emission Mask                      |
| SL      | Sidelink                                    |
| SL-MIMO | Sidelink-Multiple Antenna transmission      |
| SNR     | Signal-to-Noise Ratio                       |
| SRS     | Sounding Reference Symbol                   |
| SS      | Synchronization Symbol                      |
| SUL     | Supplementary uplink                        |
| TAE     | Time Alignment Error                        |
| TAG     | Timing Advance Group                        |
| Tx      | Transmitter                                 |
| TxD     | Tx Diversity                                |
| UL MIMO | Uplink Multiple Antenna transmission        |
| ULFPTx  | Uplink Full Power Transmission              |
| V2X     | Vehicle to Everything                       |

---

## 4 General

### 4.1 Relationship between minimum requirements and test requirements

The present document is a Single-RAT specification for NR UE, covering RF characteristics and minimum performance requirements. Conformance to the present specification is demonstrated by fulfilling the test requirements specified in the conformance specification 3GPP TS 38.521-1 [4].

The Minimum Requirements given in this specification make no allowance for measurement uncertainty. The test specification TS 38.521-1 [4] defines test tolerances. These test tolerances are individually calculated for each test. The test tolerances are used to relax the minimum requirements in this specification to create test requirements. For some requirements, including regulatory requirements, the test tolerance is set to zero.

The measurement results returned by the test system are compared - without any modification - against the test requirements as defined by the shared risk principle.

The shared risk principle is defined in Recommendation ITU-R M.1545 [5].

### 4.2 Applicability of minimum requirements

- a) In this specification the Minimum Requirements are specified as general requirements and additional requirements. Where the Requirement is specified as a general requirement, the requirement is mandated to be met in all scenarios
- b) For specific scenarios for which an additional requirement is specified, in addition to meeting the general requirement, the UE is mandated to meet the additional requirements.

- c) The spurious emissions power requirements are for the long-term average of the power. For the purpose of reducing measurement uncertainty it is acceptable to average the measured power over a period of time sufficient to reduce the uncertainty due to the statistical nature of the signal
- d) All the requirements for intra-band contiguous and non-contiguous CA apply under the assumption of the same slot format indicated by *TDD-UL-DL-ConfigurationCommon* and *TDD-UL-DL-ConfigurationDedicated* in the PCell and SCells for NR SA.
- e) The requirements for Tx diversity in this release are applied for UE which indicates IE [*txDiversity-r16*].

### 4.3 Specification suffix information

Unless stated otherwise, the suffixes shown in Table 4.3-1 are used for indicating at 2<sup>nd</sup> level clause. For shared spectrum channel access, suffixes A, B, and D are used for indicating at 3<sup>rd</sup> level clause.

**Table 4.3-1: Definition of suffixes**

| Clause suffix | Variant                               |
|---------------|---------------------------------------|
| None          | Single Carrier                        |
| A             | Carrier Aggregation (CA)              |
| B             | Dual-Connectivity (DC)                |
| C             | Supplementary Uplink (SUL)            |
| D             | UL MIMO                               |
| E             | V2X                                   |
| F             | Shared spectrum channel access        |
| G             | Tx Diversity (TxD)                    |
| H             | Carrier Aggregation (CA) with UL MIMO |
| I             | RedCap                                |

A terminal which supports the above features needs to meet both the general requirements and the additional requirement applicable to the additional clause (suffixes A to I) in clauses 5, 6 and 7. Where there is a difference in requirement between the general requirements and the additional clause requirements (suffixes A to I) in clauses 5, 6 and 7, the tighter requirements are applicable unless stated otherwise in the additional clause.

A terminal which supports advanced V2X services, public safety services and other commercial use cases related to NR sidelink operation shall meet all of the separate corresponding requirements in suffix E.

For a terminal that supports SUL for the band combination specified in Table 5.2C-1, the current version of the specification assumes the terminal is configured with active transmission either on UL carrier or SUL carrier at any time in one serving cell and the UE requirements for single carrier shall apply for the active UL or SUL carrier accordingly.

For a terminal that supports public safety service using sidelink, the minimum requirements are applicable when

- The UE is associated with a serving cell on PS carrier, or
- The UE is not associated with a serving cell on the PS carrier and is provisioned with the preconfigured radio parameters for PS that are associated with known Geographical Area, or
- The UE is associated with a serving cell on a carrier different than the PS carrier, and the radio parameters for PS that are provided by the serving cell, or
- The UE is associated with a serving cell on a carrier different than the PS carrier, and has a non-serving cell selected on the PS carrier with the preconfigured radio parameters.

When the advanced-V2X or PS UE is not associated with a serving cell on the V2X or PS carrier, and the UE does not have knowledge of its geographical area, or is provisioned with preconfigured radio parameters that are not associated with any Geographical Area, V2X or PS UE' transmissions are not allowed, and the requirements in Section 6.3E.2 apply.

For a terminal that supports operation in shared spectrum, the current version of this specification assumes in the uplink sub-bands within a wideband channel shall be contiguously allocated to the UE. The uplink requirements for one or more non-transmitted sub-bands between two transmitted sub-bands does not form a part of the current version of this specification.

Terminal that supports inter-band NR-DC configuration shall meet the minimum requirements for corresponding CA configuration (suffix A), unless otherwise specified.

A terminal which supports intra-band contiguous UL CA with UL MIMO shall meet the separate corresponding requirements in suffix H with all UL CCs with UL MIMO.

## 5 Operating bands and channel arrangement

### 5.1 General

The channel arrangements presented in this clause are based on the operating bands and channel bandwidths defined in the present release of specifications.

NOTE: Other operating bands and channel bandwidths may be considered in future releases.

Requirements throughout the RF specifications are in many cases defined separately for different frequency ranges (FR). The frequency ranges in which NR can operate according to this version of the specification are identified as described in Table 5.1-1. Whenever the FR2 is referred, both FR2-1 and FR2-2 frequency sub-ranges shall be considered, unless otherwise stated.

**Table 5.1-1: Definition of frequency ranges**

| Frequency range designation |       | Corresponding frequency range |
|-----------------------------|-------|-------------------------------|
| FR1                         |       | 410 MHz – 7125 MHz            |
| FR2                         | FR2-1 | 24250 MHz – 52600 MHz         |
|                             | FR2-2 | 52600 MHz – 71000 MHz         |

The present specification covers FR1 operating bands.

### 5.2 Operating bands

NR is designed to operate in the FR1 operating bands defined in Table 5.2-1.

**Table 5.2-1: NR operating bands in FR1**

| NR operating band | Uplink (UL) <i>operating band</i><br>BS receive / UE transmit<br>$F_{UL\_low} - F_{UL\_high}$ | Downlink (DL) <i>operating band</i><br>BS transmit / UE receive<br>$F_{DL\_low} - F_{DL\_high}$ | Duplex Mode |
|-------------------|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------|
| n1                | 1920 MHz – 1980 MHz                                                                           | 2110 MHz – 2170 MHz                                                                             | FDD         |
| n2                | 1850 MHz – 1910 MHz                                                                           | 1930 MHz – 1990 MHz                                                                             | FDD         |
| n3                | 1710 MHz – 1785 MHz                                                                           | 1805 MHz – 1880 MHz                                                                             | FDD         |
| n5                | 824 MHz – 849 MHz                                                                             | 869 MHz – 894 MHz                                                                               | FDD         |
| n7                | 2500 MHz – 2570 MHz                                                                           | 2620 MHz – 2690 MHz                                                                             | FDD         |
| n8                | 880 MHz – 915 MHz                                                                             | 925 MHz – 960 MHz                                                                               | FDD         |
| n12               | 699 MHz – 716 MHz                                                                             | 729 MHz – 746 MHz                                                                               | FDD         |
| n13               | 777 MHz – 787 MHz                                                                             | 746 MHz – 756 MHz                                                                               | FDD         |
| n14               | 788 MHz – 798 MHz                                                                             | 758 MHz – 768 MHz                                                                               | FDD         |
| n18               | 815 MHz – 830 MHz                                                                             | 860 MHz – 875 MHz                                                                               | FDD         |
| n20               | 832 MHz – 862 MHz                                                                             | 791 MHz – 821 MHz                                                                               | FDD         |
| n24 <sup>16</sup> | 1626.5 MHz – 1660.5 MHz                                                                       | 1525 MHz – 1559 MHz                                                                             | FDD         |
| n25               | 1850 MHz – 1915 MHz                                                                           | 1930 MHz – 1995 MHz                                                                             | FDD         |
| n26               | 814 MHz – 849 MHz                                                                             | 859 MHz – 894 MHz                                                                               | FDD         |

| NR operating band                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Uplink (UL) operating band<br>BS receive / UE transmit<br>$F_{UL\_low} - F_{UL\_high}$ | Downlink (DL) operating band<br>BS transmit / UE receive<br>$F_{DL\_low} - F_{DL\_high}$ | Duplex Mode |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|-------------|
| n28                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 703 MHz – 748 MHz                                                                      | 758 MHz – 803 MHz                                                                        | FDD         |
| n29 <sup>15</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | N/A                                                                                    | 717 MHz – 728 MHz                                                                        | SDL         |
| n30 <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2305 MHz – 2315 MHz                                                                    | 2350 MHz – 2360 MHz                                                                      | FDD         |
| n34                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2010 MHz – 2025 MHz                                                                    | 2010 MHz – 2025 MHz                                                                      | TDD         |
| n38 <sup>10</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 2570 MHz – 2620 MHz                                                                    | 2570 MHz – 2620 MHz                                                                      | TDD         |
| n39                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1880 MHz – 1920 MHz                                                                    | 1880 MHz – 1920 MHz                                                                      | TDD         |
| n40                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2300 MHz – 2400 MHz                                                                    | 2300 MHz – 2400 MHz                                                                      | TDD         |
| n41                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2496 MHz – 2690 MHz                                                                    | 2496 MHz – 2690 MHz                                                                      | TDD         |
| n46 <sup>13,14</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 5150 MHz – 5925 MHz                                                                    | 5150 MHz – 5925 MHz                                                                      | TDD         |
| n47 <sup>11</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 5855 MHz – 5925 MHz                                                                    | 5855 MHz – 5925 MHz                                                                      | TDD         |
| n48                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 3550 MHz – 3700 MHz                                                                    | 3550 MHz – 3700 MHz                                                                      | TDD         |
| n50 <sup>1</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 1432 MHz – 1517 MHz                                                                    | 1432 MHz – 1517 MHz                                                                      | TDD         |
| n51                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1427 MHz – 1432 MHz                                                                    | 1427 MHz – 1432 MHz                                                                      | TDD         |
| n53                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2483.5 MHz – 2495 MHz                                                                  | 2483.5 MHz – 2495 MHz                                                                    | TDD         |
| n65 <sup>4</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 1920 MHz – 2010 MHz                                                                    | 2110 MHz – 2200 MHz                                                                      | FDD         |
| n66 <sup>6,7</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1710 MHz – 1780 MHz                                                                    | 2110 MHz – 2200 MHz                                                                      | FDD         |
| n67 <sup>19</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | N/A                                                                                    | 738 MHz – 758 MHz                                                                        | SDL         |
| n70                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1695 MHz – 1710 MHz                                                                    | 1995 MHz – 2020 MHz                                                                      | FDD         |
| n71                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 663 MHz – 698 MHz                                                                      | 617 MHz – 652 MHz                                                                        | FDD         |
| n74                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1427 MHz – 1470 MHz                                                                    | 1475 MHz – 1518 MHz                                                                      | FDD         |
| n75 <sup>2,19</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | N/A                                                                                    | 1432 MHz – 1517 MHz                                                                      | SDL         |
| n76 <sup>19</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | N/A                                                                                    | 1427 MHz – 1432 MHz                                                                      | SDL         |
| n77 <sup>12</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 3300 MHz – 4200 MHz                                                                    | 3300 MHz – 4200 MHz                                                                      | TDD         |
| n78                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 3300 MHz – 3800 MHz                                                                    | 3300 MHz – 3800 MHz                                                                      | TDD         |
| n79 <sup>17</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 4400 MHz – 5000 MHz                                                                    | 4400 MHz – 5000 MHz                                                                      | TDD         |
| n80                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1710 MHz – 1785 MHz                                                                    | N/A                                                                                      | SUL         |
| n81                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 880 MHz – 915 MHz                                                                      | N/A                                                                                      | SUL         |
| n82                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 832 MHz – 862 MHz                                                                      | N/A                                                                                      | SUL         |
| n83                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 703 MHz – 748 MHz                                                                      | N/A                                                                                      | SUL         |
| n84                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1920 MHz – 1980 MHz                                                                    | N/A                                                                                      | SUL         |
| n85                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 698 MHz – 716 MHz                                                                      | 728 MHz – 746 MHz                                                                        | FDD         |
| n86                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1710 MHz – 1780 MHz                                                                    | N/A                                                                                      | SUL         |
| n89                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 824 MHz – 849 MHz                                                                      | N/A                                                                                      | SUL         |
| n90 <sup>5</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2496 MHz – 2690 MHz                                                                    | 2496 MHz – 2690 MHz                                                                      | TDD         |
| n91 <sup>9</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 832 MHz – 862 MHz                                                                      | 1427 MHz – 1432 MHz                                                                      | FDD         |
| n92 <sup>9</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 832 MHz – 862 MHz                                                                      | 1432 MHz – 1517 MHz                                                                      | FDD         |
| n93 <sup>9</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 880 MHz – 915 MHz                                                                      | 1427 MHz – 1432 MHz                                                                      | FDD         |
| n94 <sup>9</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 880 MHz – 915 MHz                                                                      | 1432 MHz – 1517 MHz                                                                      | FDD         |
| n95 <sup>8</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2010 MHz – 2025 MHz                                                                    | N/A                                                                                      | SUL         |
| n96 <sup>13,14</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 5925 MHz – 7125 MHz                                                                    | 5925 MHz – 7125 MHz                                                                      | TDD         |
| n97 <sup>15</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 2300 MHz – 2400 MHz                                                                    | N/A                                                                                      | SUL         |
| n98 <sup>15</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 1880 MHz – 1920 MHz                                                                    | N/A                                                                                      | SUL         |
| n99 <sup>21</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 1626.5 MHz – 1660.5 MHz                                                                | N/A                                                                                      | SUL         |
| n100 <sup>20</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 874.4 MHz – 880 MHz                                                                    | 919.4 MHz – 925 MHz                                                                      | FDD         |
| n101 <sup>20</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1900 MHz – 1910 MHz                                                                    | 1900 MHz – 1910 MHz                                                                      | TDD         |
| n102 <sup>13,14</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 5925 MHz – 6425 MHz                                                                    | 5925 MHz – 6425 MHz                                                                      | TDD         |
| n104 <sup>17,18</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 6425 MHz – 7125 MHz                                                                    | 6425 MHz – 7125 MHz                                                                      | TDD         |
| <p>NOTE 1: UE that complies with the NR Band n50 minimum requirements in this specificationshall also comply with the NR Band n51 minimum requirements.</p> <p>NOTE 2: UE that complies with the NR Band n75 minimum requirements in this specificationshall also comply with the NR Band n76 minimum requirements.</p> <p>NOTE 3: Uplink transmission is not allowed at this band for UE with external vehicle-mounted antennas.</p> <p>NOTE 4: A UE that complies with the NR Band n65 minimum requirements in this specification shall also comply with the NR Band n1 minimum requirements.</p> <p>NOTE 5: Unless otherwise stated, the applicability of requirements for Band n90 is in accordance with that for Band n41; a UE supporting Band n90 shall meet the requirements for Band n41. A UE supporting Band n90 shall also support band n41.</p> <p>NOTE 6: A UE that supports NR Band n66 shall receive in the entire DL operating band.</p> <p>NOTE 7: A UE that supports NR Band n66 and CA operation in any CA band shall also comply with the minimum requirements specified for the DL CA configurations CA_n66B and CA_n66(2A) in the current version of the specification.</p> <p>NOTE 8: This band is applicable in China only.</p> |                                                                                        |                                                                                          |             |

| NR operating band                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Uplink (UL) <i>operating band</i><br>BS receive / UE transmit<br>$F_{UL\_low} - F_{UL\_high}$ | Downlink (DL) <i>operating band</i><br>BS transmit / UE receive<br>$F_{DL\_low} - F_{DL\_high}$ | Duplex Mode |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------|
| <p>NOTE 9: Variable duplex operation does not enable dynamic variable duplex configuration by the network, and is used such that DL and UL frequency ranges are supported independently in any valid frequency range for the band.</p> <p>NOTE 10: When this band is used for V2X SL service, the band is exclusively used for NR V2X in particular regions.</p> <p>NOTE 11: This band is unlicensed band used for V2X service. There is no expected network deployment in this band.</p> <p>NOTE 12: In the USA this band is restricted to 3450 – 3550 MHz and 3700 – 3980 MHz. In Canada this band is restricted to 3450 – 3650 MHz and 3650 – 3980 MHz.</p> <p>NOTE 13: This band is restricted to operation with shared spectrum channel access as defined in TS 37.213 [14].</p> <p>NOTE 14: This band is applicable only in countries/regions designating this band for shared-spectrum access use subject to country-specific conditions.</p> <p>NOTE 15: The requirements for this band are applicable only where no other NR or E-UTRA TDD operating band(s) are used within the frequency range of this band in the same geographical area. For scenarios where other NR or E-UTRA TDD operating band(s) are used within the frequency range of this band in the same geographical area, special co-existence requirements may apply that are not covered by the 3GPP specifications.</p> <p>NOTE 16: DL operation in this band is restricted to 1526 – 1536 MHz and UL operation is restricted to 1627.5 – 1637.5 MHz and 1646.5 – 1656.5 MHz.</p> <p>NOTE 17: For this band, CORESET#0 values from Table 13-5 or Table 13-6 in [8, TS 38.213] are applied regardless of the minimum channel bandwidth.</p> <p>NOTE 18: This band is applicable only in countries/regions designating this band for IMT licensed operation subject to country-specific conditions.</p> <p>NOTE 19: For SDL bands, downlink configuration for RRM performance testing is same as FDD.</p> <p>NOTE 20: This band is applicable only in countries subject to ECC Decision (20)02 [16], for the FRMCS application.</p> <p>NOTE 21: UL operation in this band is restricted to 1627.5 – 1637.5 MHz and 1646.5 – 1656.5 MHz.</p> |                                                                                               |                                                                                                 |             |

## 5.2A Operating bands for CA

### 5.2A.0 General

CA operating bands including Band n90 are defined by the corresponding CA operating bands including Band n41 with Band n90 replacing Band n41. For brevity the said CA operating bands including Band n90 are not listed in the tables below but are covered by this specification.

### 5.2A.1 Intra-band CA

NR intra-band carrier aggregation is designed to operate in the operating bands defined in Table 5.2A.1-1 and Table 5.2A.1-2, where all operating bands are within FR1.

**Table 5.2A.1-1: Intra-band contiguous CA operating bands in FR1**

| NR CA Band | NR Band<br>(Table 5.2-1) |
|------------|--------------------------|
| CA_n1      | n1                       |
| CA_n2      | n2                       |
| CA_n3      | n3                       |
| CA_n5      | n5                       |
| CA_n7      | n7                       |
| CA_n25     | n25                      |
| CA_n38     | n38                      |
| CA_n40     | n40                      |
| CA_n41     | n41                      |
| CA_n46     | n46                      |

|                                                                                                                   |     |
|-------------------------------------------------------------------------------------------------------------------|-----|
| CA_n48                                                                                                            | n48 |
| CA_n66                                                                                                            | n66 |
| CA_n71                                                                                                            | n71 |
| CA_n77                                                                                                            | n77 |
| CA_n78                                                                                                            | n78 |
| CA_n79                                                                                                            | n79 |
| CA_n96                                                                                                            | n96 |
| NOTE 1: The minimum requirements only apply for non simultaneous Tx/Rx between all carriers for TDD combinations. |     |

**Table 5.2A.1-2: Intra-band non-contiguous CA operating bands in FR1**

| NR CA Band                                                                                                                                      | NR Band<br>(Table 5.2-1) |
|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| CA_n1(*)                                                                                                                                        | n1                       |
| CA_n3(*)                                                                                                                                        | n3                       |
| CA_n5(*)                                                                                                                                        | n5                       |
| CA_n7(*)                                                                                                                                        | n7                       |
| CA_n12(*)                                                                                                                                       | n12                      |
| CA_n25(*)                                                                                                                                       | n25                      |
| CA_n41(*)                                                                                                                                       | n41                      |
| CA_n48(*)                                                                                                                                       | n48                      |
| CA_n66(*)                                                                                                                                       | n66                      |
| CA_n71(*)                                                                                                                                       | n71                      |
| CA_n77(*)                                                                                                                                       | n77                      |
| CA_n78(*)                                                                                                                                       | n78                      |
| CA_n96(*)                                                                                                                                       | n96                      |
| NOTE 1: The minimum requirements only apply for non simultaneous Tx/Rx between all carriers for TDD combinations.                               |                          |
| NOTE 2: The notation CA_nX(*) in this table indicates intra-band non-contiguous CA for band nX. The configurations for each band are in 5.5A.2. |                          |

## 5.2A.2 Inter-band CA

NR inter-band carrier aggregation is designed to operate in the operating bands defined in Table 5.2A.2.1-1, Table 5.2A.2.2-1, Table 5.2A.2.3-1 and Table 5.2A.2.4-1, where all operating bands are within FR1.

If the mandatory simultaneous Rx/Tx capability applies for a lower order band combination, when the applicable lower order band combination is a band pair in a higher order band combination, the mandatory simultaneous Rx/Tx capability also applies for the band pair in the higher order band combination.

**Table 5.2A.2-1: Void**

**Table 5.2A.2-2: Void**

**Table 5.2A.2-3: Void**

### 5.2A.2.1 Inter-band CA (two bands)



**Table 5.2A.2.1-1: Inter-band CA operating bands involving FR1 (two bands)**

| NR CA Band             | NR Band<br>(Table 5.2-1) | DL interruption allowed<br>(Note 8) |
|------------------------|--------------------------|-------------------------------------|
| CA_n1-n3               | n1, n3                   |                                     |
| CA_n1-n5               | n1, n5                   |                                     |
| CA_n1-n7               | n1, n7                   |                                     |
| CA_n1-n8               | n1, n8                   |                                     |
| CA_n1-n18              | n1, n18                  |                                     |
| CA_n1-n20              | n1, n20                  |                                     |
| CA_n1-n28              | n1, n28                  |                                     |
| CA_n1-n38              | n1, n38                  |                                     |
| CA_n1-n40              | n1, n40                  |                                     |
| CA_n1-n41 <sup>1</sup> | n1, n41                  |                                     |
| CA_n1-n67              | n1, n67                  |                                     |
| CA_n1-n74              | n1, n74                  |                                     |
| CA_n1-n77 <sup>1</sup> | n1, n77                  | No                                  |
| CA_n1-n78 <sup>1</sup> | n1, n78                  | No                                  |
| CA_n1-n79 <sup>1</sup> | n1, n79                  | No                                  |
| CA_n2-n5               | n2, n5                   |                                     |
| CA_n2-n7               | n2, n7                   |                                     |
| CA_n2-n12              | n2, n12                  |                                     |
| CA_n2-n14              | n2, n14                  |                                     |
| CA_n2-n29              | n2, n29                  |                                     |
| CA_n2-n30              | n2, n30                  |                                     |
| CA_n2-n48              | n2, n48                  |                                     |
| CA_n2-n66              | n2, n66                  |                                     |
| CA_n2-n77              | n2, n77                  |                                     |
| CA_n2-n78              | n2, n78                  |                                     |
| CA_n3-n5               | n3, n5                   |                                     |
| CA_n3-n7               | n3, n7                   |                                     |
| CA_n3-n8               | n3, n8                   |                                     |
| CA_n3-n18              | n3, n18                  |                                     |
| CA_n3-n20              | n3, n20                  |                                     |
| CA_n3-n28              | n3, n28                  |                                     |
| CA_n3-n34 <sup>1</sup> | n3, n34                  |                                     |
| CA_n3-n38              | n3, n38                  |                                     |
| CA_n3-n40 <sup>1</sup> | n3, n40                  | No                                  |
| CA_n3-n41 <sup>1</sup> | n3, n41                  | No                                  |
| CA_n3-n67              | n3, n67                  |                                     |
| CA_n3-n74              | n3, n74                  |                                     |
| CA_n3-n75              | n3, n75                  |                                     |
| CA_n3-n77 <sup>1</sup> | n3, n77                  | No                                  |
| CA_n3-n78 <sup>1</sup> | n3, n78                  | No                                  |
| CA_n3-n79 <sup>1</sup> | n3, n79                  | No                                  |
| CA_n5-n7               | n5, n7                   |                                     |
| CA_n5-n12              | n5, n12                  |                                     |
| CA_n5-n14              | n5, n14                  |                                     |
| CA_n5-n25              | n5, n25                  |                                     |
| CA_n5-n28              | n5, n28                  |                                     |
| CA_n5-n29              | n5, n29                  |                                     |
| CA_n5-n30              | n5, n30                  |                                     |
| CA_n5-n40              | n5, n40                  |                                     |
| CA_n5-n48              | n5, n48                  |                                     |
| CA_n5-n66              | n5, n66                  |                                     |
| CA_n5-n77 <sup>1</sup> | n5, n77                  |                                     |
| CA_n5-n78 <sup>1</sup> | n5, n78                  | No                                  |
| CA_n5-n79 <sup>1</sup> | n5, n79                  | No                                  |
| CA_n7-n8               | n7, n8                   |                                     |
| CA_n7-n25              | n7, n25                  |                                     |
| CA_n7-n28              | n7, n28                  |                                     |
| CA_n7-n40              | n7, n40                  |                                     |
| CA_n7-n46 <sup>6</sup> | n7, n46                  |                                     |
| CA_n7-n66              | n7, n66                  |                                     |
| CA_n7-n77              | n7, n77                  |                                     |

| NR CA Band               | NR Band<br>(Table 5.2-1) | DL interruption allowed<br>(Note 8) |
|--------------------------|--------------------------|-------------------------------------|
| CA n7-n78 <sup>1</sup>   | n7, n78                  |                                     |
| CA n7-n79                | n7, n79                  |                                     |
| CA n8-n20                | n8, n20                  |                                     |
| CA n8-n28                | n8, n28                  |                                     |
| CA n8-n34 <sup>1</sup>   | n8, n34                  |                                     |
| CA n8-n38                | n8, n38                  |                                     |
| CA n8-n39 <sup>1</sup>   | n8, n39                  |                                     |
| CA n8-n40 <sup>1</sup>   | n8, n40                  |                                     |
| CA n8-n41 <sup>1</sup>   | n8, n41                  | No                                  |
| CA n8-n75 <sup>1</sup>   | n8, n75                  |                                     |
| CA n8-n77 <sup>1</sup>   | n8, n77                  |                                     |
| CA n8-n78 <sup>1</sup>   | n8, n78                  | No                                  |
| CA n8-n79 <sup>1</sup>   | n8, n79                  | No                                  |
| CA n12-n25               | n12, n25                 |                                     |
| CA n12-n30               | n12, n30                 |                                     |
| CA n12-n48               | n12, n48                 |                                     |
| CA n12-n66               | n12, n66                 |                                     |
| CA n12-n71               | n12, n71                 |                                     |
| CA n12-n77               | n12, n77                 |                                     |
| CA n13-n25               | n13, n25                 |                                     |
| CA n13-n66               | n13, n66                 |                                     |
| CA n13-n77               | n13, n77                 |                                     |
| CA n14-n30               | n14, n30                 |                                     |
| CA n14-n66               | n14, n66                 |                                     |
| CA n14-n77               | n14, n77                 |                                     |
| CA n18-n28               | n18, n28                 |                                     |
| CA n18-n41 <sup>1</sup>  | n18, n41                 |                                     |
| CA n18-n74               | n18, n74                 |                                     |
| CA n18-n77 <sup>10</sup> | n18, n77                 |                                     |
| CA n18-n78 <sup>11</sup> | n18, n78                 |                                     |
| CA n20-n28 <sup>2</sup>  | n20, n28                 |                                     |
| CA n20-n40               | n20, n40                 |                                     |
| CA n20-n67               | n20, n67                 |                                     |
| CA n20-n75               | n20, n75                 |                                     |
| CA n20-n78               | n20, n78                 |                                     |
| CA n24-n41               | n24, n41                 |                                     |
| CA n24-n48               | n24, n48                 |                                     |
| CA n24-n77               | n24, n77                 |                                     |
| CA n25-n29               | n25, n29                 |                                     |
| CA n25-n38               | n25, n38                 |                                     |
| CA n25-n41               | n25, n41                 |                                     |
| CA n25-n46 <sup>6</sup>  | n25, n46                 |                                     |
| CA n25-n48               | n25, n48                 |                                     |
| CA n25-n66               | n25, n66                 |                                     |
| CA n25-n71               | n25, n71                 |                                     |
| CA n25-n77               | n25, n77                 |                                     |
| CA n25-n78               | n25, n78                 |                                     |
| CA n26-n66               | n26, n66                 |                                     |
| CA n26-n70               | n26, n70                 |                                     |
| CA n28-n34               | n28, n34                 |                                     |
| CA n28-n38               | n28, n38                 |                                     |
| CA n28-n39               | n28, n39                 |                                     |
| CA n28-n40 <sup>1</sup>  | n28, n40                 |                                     |
| CA n28-n41 <sup>1</sup>  | n28, n41                 |                                     |
| CA n28-n46 <sup>6</sup>  | n28, n46                 |                                     |
| CA n28-n50               | n28, n50                 |                                     |
| CA n28-n71 <sup>12</sup> | n28, n71                 |                                     |
| CA n28-n74               | n28, n74                 |                                     |
| CA n28-n75 <sup>2</sup>  | n28, n75                 |                                     |
| CA n28-n77 <sup>1</sup>  | n28, n77                 | No                                  |
| CA n28-n78 <sup>1</sup>  | n28, n78                 | No                                  |
| CA n28-n79 <sup>1</sup>  | n28, n79                 |                                     |
| CA n29-n30               | n29, n30                 |                                     |

| NR CA Band                                                                                                                                                                                                                                                                                                                                             | NR Band<br>(Table 5.2-1) | DL interruption allowed<br>(Note 8) |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-------------------------------------|
| CA n29-n66                                                                                                                                                                                                                                                                                                                                             | n29, n66                 |                                     |
| CA n29-n70                                                                                                                                                                                                                                                                                                                                             | n29, n70                 |                                     |
| CA n29-n71                                                                                                                                                                                                                                                                                                                                             | n29, n71                 |                                     |
| CA n29-n77                                                                                                                                                                                                                                                                                                                                             | n29, n77                 |                                     |
| CA n30-n66                                                                                                                                                                                                                                                                                                                                             | n30, n66                 |                                     |
| CA n30-n77                                                                                                                                                                                                                                                                                                                                             | n30, n77                 |                                     |
| CA n34-n40                                                                                                                                                                                                                                                                                                                                             | n34, n40                 |                                     |
| CA n34-n41 <sup>9</sup>                                                                                                                                                                                                                                                                                                                                | n34, n41                 |                                     |
| CA n34-n79 <sup>1</sup>                                                                                                                                                                                                                                                                                                                                | n34, n79                 |                                     |
| CA n38-n40 <sup>9</sup>                                                                                                                                                                                                                                                                                                                                | n38, n40                 |                                     |
| CA n38-n66                                                                                                                                                                                                                                                                                                                                             | n38, n66                 |                                     |
| CA n38-n71                                                                                                                                                                                                                                                                                                                                             | n38, n71                 |                                     |
| CA n38-n78 <sup>1</sup>                                                                                                                                                                                                                                                                                                                                | n38, n78                 |                                     |
| CA n38-n79 <sup>1</sup>                                                                                                                                                                                                                                                                                                                                | n38, n79                 |                                     |
| CA n39-n40                                                                                                                                                                                                                                                                                                                                             | n39, n40                 |                                     |
| CA n39-n41                                                                                                                                                                                                                                                                                                                                             | n39, n41                 | No                                  |
| CA n39-n79 <sup>1</sup>                                                                                                                                                                                                                                                                                                                                | n39, n79                 | No                                  |
| CA n40-n41                                                                                                                                                                                                                                                                                                                                             | n40, n41                 |                                     |
| CA n40-n77 <sup>1</sup>                                                                                                                                                                                                                                                                                                                                | n40, n77                 |                                     |
| CA n40-n78 <sup>1</sup>                                                                                                                                                                                                                                                                                                                                | n40, n78                 |                                     |
| CA n40-n79 <sup>1,4</sup>                                                                                                                                                                                                                                                                                                                              | n40, n79                 | No                                  |
| CA n41-n48 <sup>1</sup>                                                                                                                                                                                                                                                                                                                                | n41, n48                 |                                     |
| CA n41-n50 <sup>1</sup>                                                                                                                                                                                                                                                                                                                                | n41, n50                 |                                     |
| CA n41-n66                                                                                                                                                                                                                                                                                                                                             | n41, n66                 |                                     |
| CA n41-n70                                                                                                                                                                                                                                                                                                                                             | n41, n70                 |                                     |
| CA n41-n71 <sup>1</sup>                                                                                                                                                                                                                                                                                                                                | n41, n71                 |                                     |
| CA n41-n74                                                                                                                                                                                                                                                                                                                                             | n41, n74                 |                                     |
| CA n41-n77 <sup>1</sup>                                                                                                                                                                                                                                                                                                                                | n41, n77                 |                                     |
| CA n41-n78 <sup>1</sup>                                                                                                                                                                                                                                                                                                                                | n41, n78                 |                                     |
| CA n41-n79 <sup>1,3</sup>                                                                                                                                                                                                                                                                                                                              | n41, n79                 | No                                  |
| CA n46-n48 <sup>1,6</sup>                                                                                                                                                                                                                                                                                                                              | n46, n48                 |                                     |
| CA n46-n66 <sup>6</sup>                                                                                                                                                                                                                                                                                                                                | n46, n66                 |                                     |
| CA n46-n78 <sup>1,6</sup>                                                                                                                                                                                                                                                                                                                              | n46, n78                 |                                     |
| CA n46-n96 <sup>15,16,17,18</sup>                                                                                                                                                                                                                                                                                                                      | n46, n96                 |                                     |
| CA n48-n53 <sup>9</sup>                                                                                                                                                                                                                                                                                                                                | n48, n53                 |                                     |
| CA n48-n66                                                                                                                                                                                                                                                                                                                                             | n48, n66                 |                                     |
| CA n48-n70                                                                                                                                                                                                                                                                                                                                             | n48, n70                 |                                     |
| CA n48-n71                                                                                                                                                                                                                                                                                                                                             | n48, n71                 |                                     |
| CA n48-n77 <sup>13,14,18</sup>                                                                                                                                                                                                                                                                                                                         | n48, n77                 |                                     |
| CA n48-n96 <sup>1, 6</sup>                                                                                                                                                                                                                                                                                                                             | n48, n96                 |                                     |
| CA n50-n78                                                                                                                                                                                                                                                                                                                                             | n50, n78                 |                                     |
| CA n66-n70                                                                                                                                                                                                                                                                                                                                             | n66, n70                 |                                     |
| CA n66-n71                                                                                                                                                                                                                                                                                                                                             | n66, n71                 |                                     |
| CA n66-n77                                                                                                                                                                                                                                                                                                                                             | n66, n77                 |                                     |
| CA n66-n78                                                                                                                                                                                                                                                                                                                                             | n66, n78                 |                                     |
| CA n70-n71                                                                                                                                                                                                                                                                                                                                             | n70, n71                 |                                     |
| CA n70-n78                                                                                                                                                                                                                                                                                                                                             | n70, n78                 |                                     |
| CA n71-n77                                                                                                                                                                                                                                                                                                                                             | n71, n77                 |                                     |
| CA n71-n78                                                                                                                                                                                                                                                                                                                                             | n71, n78                 |                                     |
| CA n74-n77 <sup>1</sup>                                                                                                                                                                                                                                                                                                                                | n74, n77                 |                                     |
| CA n74-n78 <sup>1</sup>                                                                                                                                                                                                                                                                                                                                | n74, n78                 |                                     |
| CA n75-n78 <sup>1</sup>                                                                                                                                                                                                                                                                                                                                | n75, n78                 |                                     |
| CA n76-n78 <sup>1</sup>                                                                                                                                                                                                                                                                                                                                | n76, n78                 |                                     |
| CA n77-n78 <sup>7</sup>                                                                                                                                                                                                                                                                                                                                | n77, n78                 |                                     |
| CA n77-n79 <sup>7</sup>                                                                                                                                                                                                                                                                                                                                | n77, n79                 |                                     |
| CA n78-n79 <sup>5</sup>                                                                                                                                                                                                                                                                                                                                | n78, n79                 |                                     |
| CA n78-n92                                                                                                                                                                                                                                                                                                                                             | n78, n92                 |                                     |
| NOTE 1: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability.<br>NOTE 2: The frequency range in band n28 is restricted for this band combination to 703-733 MHz for the UL and 758-788 MHz for the DL.<br>NOTE 3: The frequency range below 2506 MHz for Band n41 is not used in this combination. |                          |                                     |

| NR CA Band                                                                                                                                                                                                                                                                                                            | NR Band<br>(Table 5.2-1) | DL interruption allowed<br>(Note 8) |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-------------------------------------|
| NOTE 4: Applicable for frequency range above 4800 MHz for Band n79 in this combination.                                                                                                                                                                                                                               |                          |                                     |
| NOTE 5: For UEs supporting band n77, the minimum requirements apply only when there is non-simultaneous Rx/Tx operation between n78-n79 NR carriers. This restriction applies also for these carriers when applicable NR CA configuration is part of a higher order configuration.                                    |                          |                                     |
| NOTE 6: The PCell is allocated in the licensed band in this combination.                                                                                                                                                                                                                                              |                          |                                     |
| NOTE 7: The minimum requirements apply only when there is non-simultaneous Rx/Tx operation between n77-n78 or n77-n79 NR carriers. This restriction applies also for these carriers when applicable NR CA configuration is part of a higher order configuration.                                                      |                          |                                     |
| NOTE 8: Applicable when dynamic Tx switching is conducted. The DL interruption requirement is specified in clause 8.2.2.2.10 of 38.133 [13].                                                                                                                                                                          |                          |                                     |
| NOTE 9: Only applicable for UE supporting inter-band carrier aggregation without simultaneous Rx/Tx. Same restrictions are applied when applicable NR CA configuration is part of a higher order configurations.                                                                                                      |                          |                                     |
| NOTE 10: The frequency range in band n77 is restricted for this band combination to 3520-3560 MHz, 3700-3800 MHz, 4000-4100 MHz.                                                                                                                                                                                      |                          |                                     |
| NOTE 11: The frequency range in band n78 is restricted for this band combination to 3520-3560 MHz and 3700- 3800 MHz.                                                                                                                                                                                                 |                          |                                     |
| NOTE 12: The implementation with 4 antennas is targeted for FWA form factor for this band combination.                                                                                                                                                                                                                |                          |                                     |
| NOTE 13: Simultaneous Rx/Tx capability for TDD combinations does not apply for UEs supporting band n48 with an n77 implementation. Same restrictions are applied when applicable NR CA configuration is part of a higher order configurations.                                                                        |                          |                                     |
| NOTE 14: The band n48 and n77 will synchronize their uplink and downlink configurations and in commonly TDD network coordination                                                                                                                                                                                      |                          |                                     |
| NOTE 15: Simultaneous Rx/Tx capability does not apply for UEs supporting CA_n46-n96. Same restrictions are applied when applicable NR CA configuration is part of a higher order configurations                                                                                                                       |                          |                                     |
| NOTE 16: The minimum requirements for intra-band non-contiguous CA/DC apply for CA_n46-n96 and related higher order CA/DC configurations.                                                                                                                                                                             |                          |                                     |
| NOTE 17: The combination is not used alone as fall back mode of other band combinations in which UL in Band 48 is not used.                                                                                                                                                                                           |                          |                                     |
| NOTE 18: The minimum requirements for inter-band CA apply when the maximum power spectral density imbalance between downlink carriers is within 6 dB. The power spectral density imbalance condition also applies for these carriers when applicable CA configuration is a subset of a higher order CA configuration. |                          |                                     |

### 5.2A.2.2 Inter-band CA (three bands)

**Table 5.2A.2.2-1: Inter-band CA operating bands involving FR1 (three bands)**

| NR CA Band                | NR Band<br>(Table 5.2-1) | DL interruption allowed<br>(Note 4) |
|---------------------------|--------------------------|-------------------------------------|
| CA_n1-n3-n5               | n1, n3, n5               |                                     |
| CA_n1-n3-n7               | n1, n3, n7               |                                     |
| CA_n1-n3-n8               | n1, n3, n8               |                                     |
| CA_n1-n3-n18              | n1, n3, n18              |                                     |
| CA_n1-n3-n20              | n1, n3, n20              |                                     |
| CA_n1-n3-n28              | n1, n3, n28              |                                     |
| CA_n1-n3-n41 <sup>3</sup> | n1, n3, n41              |                                     |
| CA_n1-n3-n77              | n1, n3, n77              |                                     |
| CA_n1-n3-n78 <sup>3</sup> | n1, n3, n78              | No for CA_n1-n78, CA_n3-n78         |
| CA_n1-n3-n79 <sup>3</sup> | n1, n3, n79              |                                     |
| CA_n1-n5-n7               | n1, n5, n7               |                                     |
| CA_n1-n5-n28              | n1, n5, n28              |                                     |
| CA_n1-n5-n78              | n1, n5, n78              |                                     |
| CA_n1-n7-n8               | n1, n7, n8               |                                     |
| CA_n1-n7-n28              | n1, n7, n28              |                                     |
| CA_n1-n7-n40              | n1, n7, n40              |                                     |
| CA_n1-n7-n78 <sup>3</sup> | n1, n7, n78              |                                     |

| NR CA Band                 | NR Band<br>(Table 5.2-1) | DL interruption allowed<br>(Note 4) |
|----------------------------|--------------------------|-------------------------------------|
| CA_n1-n7-n79               | n1, n7, n79              |                                     |
| CA_n1-n8-n28               | n1, n8, n28              |                                     |
| CA_n1-n8-n40               | n1, n8, n40              |                                     |
| CA_n1-n8-n77               | n1, n8, n77              |                                     |
| CA_n1-n8-n78 <sup>3</sup>  | n1, n8, n78              |                                     |
| CA_n1-n8-n79               | n1, n8, n79              |                                     |
| CA_n1-n18-n28              | n1, n18, n28             |                                     |
| CA_n1-n18-n41              | n1, n18, n41             |                                     |
| CA_n1-n18-n77              | n1, n18, n77             |                                     |
| CA_n1-n20-n67              | n1, n20, n67             |                                     |
| CA_n1-n20-n78              | n1, n20, n78             |                                     |
| CA_n1-n28-n38              | n1, n28, n38             |                                     |
| CA_n1-n28-n40              | n1, n28, n40             |                                     |
| CA_n1-n28-n41 <sup>3</sup> | n1, n28, n41             |                                     |
| CA_n1-n28-n77 <sup>3</sup> | n1, n28, n77             |                                     |
| CA_n1-n28-n78 <sup>3</sup> | n1, n28, n78             |                                     |
| CA_n1-n28-n79 <sup>3</sup> | n1, n28, n79             |                                     |
| CA_n1-n38-n78              | n1, n38, n78             |                                     |
| CA_n1-n40-n78              | n1, n40, n78             |                                     |
| CA_n1-n41-n77 <sup>3</sup> | n1, n41, n77             |                                     |
| CA_n1-n77-n79              | n1, n77, n79             |                                     |
| CA_n1-n78-n79              | n1, n78, n79             |                                     |
| CA_n2-n5-n30               | n2, n5, n30              |                                     |
| CA_n2-n5-n48               | n2, n5, n48              |                                     |
| CA_n2-n5-n66               | n2, n5, n66              |                                     |
| CA_n2-n5-n77               | n2, n5, n77              |                                     |
| CA_n2-n12-n30              | n2, n12, n30             |                                     |
| CA_n2-n12-n66              | n2, n12, n66             |                                     |
| CA_n2-n12-n77              | n2, n12, n77             |                                     |
| CA_n2-n14-n30              | n2, n14, n30             |                                     |
| CA_n2-n14-n66              | n2, n14, n66             |                                     |
| CA_n2-n14-n77              | n2, n14, n77             |                                     |
| CA_n2-n29-n30              | n2, n29, n30             |                                     |
| CA_n2-n29-n66              | n2, n29, n66             |                                     |
| CA_n2-n29-n77              | n2, n29, n77             |                                     |
| CA_n2-n30-n66              | n2, n30, n66             |                                     |
| CA_n2-n30-n77              | n2, n30, n77             |                                     |
| CA_n2-n48-n66              | n2, n48, n66             |                                     |
| CA_n2-n48-n77              | n2, n48, n77             |                                     |
| CA_n2-n66-n77              | n2, n66, n77             |                                     |
| CA_n2-n66-n78              | n2, n66, n78             |                                     |
| CA_n2-n71-n78              | n2, n71, n78             |                                     |
| CA_n3-n5-n7                | n3, n5, n7               |                                     |
| CA_n3-n5-n28               | n3, n5, n28              |                                     |
| CA_n3-n5-n78               | n3, n5, n78              |                                     |
| CA_n3-n7-n8                | n3, n7, n8               |                                     |
| CA_n3-n7-n28               | n3, n7, n28              |                                     |
| CA_n3-n7-n78 <sup>3</sup>  | n3, n7, n78              |                                     |
| CA_n3-n8-n28               | n3, n8, n28              |                                     |
| CA_n3-n8-n41               | n3, n8, n41              |                                     |
| CA_n3-n8-n77               | n3, n8, n77              |                                     |
| CA_n3-n8-n78 <sup>3</sup>  | n3, n8, n78              |                                     |
| CA_n3-n8-n79               | n3, n8, n79              |                                     |
| CA_n3-n18-n28              | n3, n18, n28             |                                     |
| CA_n3-n18-n41              | n3, n18, n41             |                                     |
| CA_n3-n18-n77              | n3, n18, n77             |                                     |
| CA_n3-n20-n67              | n3, n20, n67             |                                     |
| CA_n3-n20-n78              | n3, n20, n78             |                                     |
| CA_n3-n28-n41 <sup>3</sup> | n3, n28, n41             |                                     |
| CA_n3-n28-n77 <sup>3</sup> | n3, n28, n77             |                                     |
| CA_n3-n28-n78 <sup>3</sup> | n3, n28, n78             |                                     |
| CA_n3-n28-n79 <sup>3</sup> | n3, n28, n79             |                                     |
| CA_n3-n38-n40              | n3, n38, n40             |                                     |

| NR CA Band                 | NR Band<br>(Table 5.2-1) | DL interruption allowed<br>(Note 4) |
|----------------------------|--------------------------|-------------------------------------|
| CA_n3-n40-n41              | n3, n40, n41             | No for CA n3-n40, CA n3-n41         |
| CA_n3-n41-n77 <sup>3</sup> | n3, n41, n77             |                                     |
| CA_n3-n41-n78 <sup>3</sup> | n3, n41, n78             |                                     |
| CA_n3-n41-n79 <sup>3</sup> | n3, n41, n79             | No                                  |
| CA_n3-n77-n79              | n3, n77, n79             |                                     |
| CA_n5-n7-n28               | n5, n7, n28              |                                     |
| CA_n5-n7-n78               | n5, n7, n78              |                                     |
| CA_n5-n12-n77              | n5, n12, n77             |                                     |
| CA_n5-n14-n77              | n5, n14, n77             |                                     |
| CA_n5-n25-n66              | n5, n25, n66             |                                     |
| CA_n5-n25-n77              | n5, n25, n77             |                                     |
| CA_n5-n25-n78              | n5, n25, n78             |                                     |
| CA_n5-n29-n77              | n5, n29, n77             |                                     |
| CA_n5-n30-n66              | n5, n30, n66             |                                     |
| CA_n5-n30-n77              | n5, n30, n77             |                                     |
| CA_n5-n40-n78              | n5, n40, n78             |                                     |
| CA_n5-n48-n66              | n5, n48, n66             |                                     |
| CA_n5-n48-n77              | n5, n48, n77             |                                     |
| CA_n5-n66-n77              | n5, n66, n77             |                                     |
| CA_n5-n66-n78              | n5, n66, n78             |                                     |
| CA_n7-n8-n28               | n7, n8, n28              |                                     |
| CA_n7-n8-n40               | n7, n8, n40              |                                     |
| CA_n7-n8-n78               | n7, n8, n78              |                                     |
| CA_n7-n25-n66              | n7, n25, n66             |                                     |
| CA_n7-n25-n77              | n7, n25, n77             |                                     |
| CA_n7-n25-n78              | n7, n25, n78             |                                     |
| CA_n7-n28-n78              | n7, n28, n78             |                                     |
| CA_n7-n46-n78              | n7, n46, n78             |                                     |
| CA_n7-n66-n78              | n7, n66, n78             |                                     |
| CA_n7-n66-n77              | n7, n66, n77             |                                     |
| CA_n8-n28-n78 <sup>3</sup> | n8, n28, n78             |                                     |
| CA_n8-n38-n40              | n8, n38, n40             |                                     |
| CA_n8-n39-n41              | n8, n39, n41             | No for CA n8-n41, CA n39-n41        |
| CA_n8-n40-n41              | n8, n40, n41             |                                     |
| CA_n8-n40-n78              | n8, n40, n78             |                                     |
| CA_n8-n41-n79 <sup>3</sup> | n8, n41, n79             | No                                  |
| CA_n8-n78-n79              | n8, n78, n79             |                                     |
| CA_n12-n30-n66             | n12, n30, n66            |                                     |
| CA_n12-n30-n77             | n12, n30, n77            |                                     |
| CA_n12-n66-n77             | n12, n66, n77            |                                     |
| CA_n13-n25-n66             | n13, n25, n66            |                                     |
| CA_n13-n25-n77             | n13, n25, n77            |                                     |
| CA_n13-n66-n77             | n13, n66, n77            |                                     |
| CA_n14-n30-n66             | n14, n30, n66            |                                     |
| CA_n14-n30-n77             | n14, n30, n77            |                                     |
| CA_n14-n66-n77             | n14, n66, n77            |                                     |
| CA_n18-n28-n41             | n18, n28, n41            |                                     |
| CA_n18-n28-n77             | n18, n28, n77            |                                     |
| CA_n18-n41-n77             | n18, n41, n77            |                                     |
| CA_n20-n28-n78             | n20, n28, n78            |                                     |
| CA_n24-n41-n48             | n24, n41, n48            |                                     |
| CA_n24-n41-n77             | n24, n41, n77            |                                     |
| CA_n24-n48-n77             | n24, n48, n77            |                                     |
| CA_n25-n41-n77             | n25, n41, n77            |                                     |
| CA_n25-n29-n66             | n25, n29, n66            |                                     |
| CA_n25-n38-n78             | n25, n38, n78            |                                     |
| CA_n25-n41-n66             | n25, n41, n66            |                                     |
| CA_n25-n41-n71             | n25, n41, n71            |                                     |
| CA_n25-n41-n77             | n25, n41, n77            | No for CA_n1-n78, CA_n3-n78         |
| CA_n25-n41-n78             | n25, n41, n78            |                                     |

| NR CA Band                                                                                                                                                                                                                                                                                                                                                                                                                                                        | NR Band<br>(Table 5.2-1) | DL interruption allowed<br>(Note 4) |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-------------------------------------|
| CA_n25-n48-n66                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n25, n48, n66            |                                     |
| CA_n25-n66-n71                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n25, n66, n71            |                                     |
| CA_n25-n66-n77                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n25, n66, n77            |                                     |
| CA_n25-n66-n78                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n25, n66, n78            |                                     |
| CA_n25-n71-n77                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n25, n71, n77            |                                     |
| CA_n25-n71-n78                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n25, n71, n78            |                                     |
| CA_n26-n66-n70                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n26, n66, n70            |                                     |
| CA_n28-n38-n78                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n28, n38, n78            |                                     |
| CA_n28-n39-n40                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n28, n39, n40            |                                     |
| CA_n28-n39-n41                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n28, n39, n41            |                                     |
| CA_n28-n39-n79                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n28, n39, n79            |                                     |
| CA_n28-n40-n78                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n28, n40, n78            |                                     |
| CA_n28-n40-n79                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n28, n40, n79            |                                     |
| CA_n28-n41-n77 <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                       | n28, n41, n77            |                                     |
| CA_n28-n41-n78 <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                       | n28, n41, n78            |                                     |
| CA_n28-n41-n79 <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                       | n28, n41, n79            |                                     |
| CA_n28-n46-n78                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n28, n46, n78            |                                     |
| CA_n28-n77-n79                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n28, n77, n79            |                                     |
| CA_n28-n78-n79                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n28, n78, n79            |                                     |
| CA_n29-n30-n66                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n29, n30, n66            |                                     |
| CA_n29-n30-n77                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n29, n30, n77            |                                     |
| CA_n29-n66-n70                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n29, n66, n70            |                                     |
| CA_n29-n66-n77                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n29, n66, n77            |                                     |
| CA_n30-n66-n77                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n30, n66, n77            |                                     |
| CA_n38-n66-n78                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n38, n66, n78            |                                     |
| CA_n39-n40-n41                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n39, n40, n41            |                                     |
| CA_n39-n40-n79                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n39, n40, n79            |                                     |
| CA_n39-n41-n79                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n39, n41, n79            | No                                  |
| CA_n40-n41-n79 <sup>1,2</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                     | n40, n41, n79            | No for CA_n40-n79, CA_n41-n79       |
| CA_n41-n66-n71                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n41, n66, n71            |                                     |
| CA_n41-n66-n77                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n41, n66, n77            |                                     |
| CA_n41-n66-n78                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n41, n66, n78            |                                     |
| CA_n41-n70-n78                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n41, n70, n78            |                                     |
| CA_n41-n71-n77                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n41, n71, n77            |                                     |
| CA_n41-n71-n78                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n41, n71, n78            |                                     |
| CA_n46-n48-n96                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n46, n48, n96            |                                     |
| CA_n48-n66-n70                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n48, n66, n70            |                                     |
| CA_n48-n66-n71                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n48, n66, n71            |                                     |
| CA_n48-n66-n77                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n48, n66, n77            |                                     |
| CA_n48-n70-n71                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n48, n70, n71            |                                     |
| CA_n66-n70-n71                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n66, n70, n71            |                                     |
| CA_n66-n71-n77                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n66, n71, n77            |                                     |
| CA_n66-n71-n78                                                                                                                                                                                                                                                                                                                                                                                                                                                    | n66, n71, n78            |                                     |
| NOTE 1: The frequency range below 2506 MHz for Band n41 is not used in this band combination.<br>NOTE 2: Applicable for frequency range above 4800 MHz for Band n79 in this band combination.<br>NOTE 3: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability<br>NOTE 4: Applicable when dynamic Tx switching is conducted. The DL interruption requirement is specified in clause 8.2.2.2.10 of 38.133 [13]. |                          |                                     |

### 5.2A.2.3 Inter-band CA (four bands)

**Table 5.2A.2.3-1: Inter-band CA operating bands involving FR1 (four bands)**

| NR CA Band      | NR Band<br>(Table 5.2-1) |
|-----------------|--------------------------|
| CA_n1-n3-n5-n7  | n1, n3, n5, n7           |
| CA_n1-n3-n5-n78 | n1, n3, n5, n78          |
| CA_n1-n3-n7-n28 | n1, n3, n7, n28          |

| NR CA Band                    | NR Band<br>(Table 5.2-1) |
|-------------------------------|--------------------------|
| CA_n1-n3-n7-n78               | n1, n3, n7, n78          |
| CA_n1-n3-n8-n77               | n1, n3, n8, n77          |
| CA_n1-n3-n8-n78               | n1, n3, n8, n78          |
| CA_n1-n3-n18-n28              | n1, n3, n18, n28         |
| CA_n1-n3-n18-n41              | n1, n3, n18, n41         |
| CA_n1-n3-n18-n77              | n1, n3, n18, n77         |
| CA_n1-n3-n28-n41              | n1, n3, n28, n41         |
| CA_n1-n3-n28-n77 <sup>1</sup> | n1, n3, n28, n77         |
| CA_n1-n3-n28-n78              | n1, n3, n28, n78         |
| CA_n1-n3-n28-n79 <sup>1</sup> | n1, n3, n28, n79         |
| CA_n1-n3-n41-n77              | n1, n3, n41, n77         |
| CA_n1-n3-n77-n79              | n1, n3, n77, n79         |
| CA_n1-n5-n7-n78               | n1, n5, n7, n78          |
| CA_n1-n7-n8-n40               | n1, n7, n8, n40          |
| CA_n1-n7-n8-n78               | n1, n7, n8, n78          |
| CA_n1-n7-n28-n78              | n1, n7, n28, n78         |
| CA_n1-n7-n40-n78              | n1, n7, n40, n78         |
| CA_n1-n8-n40-n78              | n1, n8, n40, n78         |
| CA_n1-n8-n78-n79              | n1, n8, n78, n79         |
| CA_n1-n18-n28-n41             | n1, n18, n28, n41        |
| CA_n1-n18-n28-n77             | n1, n18, n28, n77        |
| CA_n1-n18-n41-n77             | n1, n18, n41, n77        |
| CA_n1-n28-n40-n78             | n1, n28, n40, n78        |
| CA_n1-n28-n41-n77             | n1, n28, n41, n77        |
| CA_n1-n28-n77-n79             | n1, n28, n77, n79        |
| CA_n2-n5-n30-n66              | n2, n5, n30, n66         |
| CA_n2-n5-n30-n77              | n2, n5, n30, n77         |
| CA_n2-n5-n48-n66              | n2, n5, n48, n66         |
| CA_n2-n5-n48-n77              | n2, n5, n48, n77         |
| CA_n2-n5-n66-n77              | n2, n5, n66, n77         |
| CA_n2-n12-n30-n66             | n2, n12, n30, n66        |
| CA_n2-n12-n30-n77             | n2, n12, n30, n77        |
| CA_n2-n12-n66-n77             | n2, n12, n66, n77        |
| CA_n2-n14-n30-n66             | n2, n14, n30, n66        |
| CA_n2-n14-n30-n77             | n2, n14, n30, n77        |
| CA_n2-n14-n66-n77             | n2, n14, n66, n77        |
| CA_n2-n29-n30-n66             | n2, n29, n30, n66        |
| CA_n2-n29-n30-n77             | n2, n29, n30, n77        |
| CA_n2-n29-n66-n77             | n2, n29, n66, n77        |
| CA_n2-n48-n66-n77             | n2, n48, n66, n77        |
| CA_n2-n66-n71-n78             | n2, n66, n71, n78        |
| CA_n3-n5-n7-n78               | n3, n5, n7, n78          |
| CA_n3-n7-n28-n78              | n3, n7, n28, n78         |
| CA_n3-n18-n28-n41             | n3, n18, n28, n41        |
| CA_n3-n18-n28-n77             | n3, n18, n28, n77        |
| CA_n3-n18-n41-n77             | n3, n18, n41, n77        |
| CA_n3-n28-n41-n77             | n3, n28, n41, n77        |
| CA_n3-n28-n77-n79             | n3, n28, n77, n79        |
| CA_n3-n28-n41-n78             | n3, n28, n41, n78        |
| CA_n5-n25-n66-n77             | n5, n25, n66, n77        |
| CA_n5-n25-n66-n78             | n5, n25, n66, n78        |
| CA_n5-n30-n66-n77             | n5, n30, n66, n77        |
| CA_n5-n48-n66-n77             | n5, n48, n66, n77        |
| CA_n7-n8-n40-n78              | n7, n8, n40, n78         |
| CA_n7-n25-n66-n77             | n7, n25, n66, n77        |
| CA_n7-n25-n66-n78             | n7, n25, n66, n78        |
| CA_n12-n30-n66-n77            | n12, n30, n66, n77       |
| CA_n13-n25-n66-n77            | n13, n25, n66, n77       |
| CA_n14-n30-n66-n77            | n14, n30, n66, n77       |
| CA_n18-n28-n41-n77            | n18, n28, n41, n77       |
| CA_n25-n38-n66-n78            | n25, n38, n66, n78       |
| CA_n25-n41-n66-n71            | n25, n41, n66, n71       |
| CA_n25-n41-n66-n77            | n25, n41, n66, n77       |



| NR CA Band                                                                                                        | NR Band<br>(Table 5.2-1) |
|-------------------------------------------------------------------------------------------------------------------|--------------------------|
| CA_n25-n41-n66-n78                                                                                                | n25, n41, n66, n78       |
| CA_n25-n41-n71-n77                                                                                                | n25, n41, n71, n77       |
| CA_n25-n41-n71-n78                                                                                                | n25, n41, n71, n78       |
| CA_n25-n66-n71-n77                                                                                                | n25, n66, n71, n77       |
| CA_n25-n66-n71-n78                                                                                                | n25, n66, n71, n78       |
| CA_n29-n30-n66-n77                                                                                                | n29, n30, n66, n77       |
| CA_n41-n66-n70-n78                                                                                                | n41, n66, n70, n78       |
| CA_n41-n66-n71-n77                                                                                                | n41, n66, n71, n77       |
| CA_n41-n66-n71-n78                                                                                                | n41, n66, n71, n78       |
| NOTE 1: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability. |                          |

#### 5.2A.2.4 Inter-band CA (five bands)

**Table 5.2A.2.4-1: Inter-band CA operating bands involving FR1 (five bands)**

| NR CA Band          | NR Band<br>(Table 5.2-1) |
|---------------------|--------------------------|
| CA_n1-n3-n5-n7-n78  | n1, n3, n5, n7, n78      |
| CA_n1-n3-n7-n28-n78 | n1, n3, n7, n28, n78     |

## 5.2B Operating bands for DC

The operating bands are specified in clause 5.5B for operation with NR dual connectivity configured, where all operating bands are within FR1.

If the mandatory simultaneous Rx/Tx capability applies for a band combination, the mandatory simultaneous Rx/Tx capability also applies for the band combination when the applicable band combination is a subset of a higher order band combination.

## 5.2C Operating band combination for SUL

NR operation is designed to operate in the operating band combination defined in Table 5.2C-1, Table 5.2C-2, Table 5.2C-3 and Table 5.2C-4, where all operating bands are within FR1.

If the mandatory simultaneous Rx/Tx capability applies for a band combination, when the applicable lower order band combination is a band pair in a higher order band combination, the mandatory simultaneous Rx/Tx capability also applies for the band pair in the higher order band combination.

**Table 5.2C-1: Operating band combination for SUL in FR1**

| NR Band combination<br>for SUL | NR Band<br>(Table 5.2-1) |
|--------------------------------|--------------------------|
| SUL_n24-n99 <sup>2</sup>       | n24, n99                 |
| SUL_n41-n80 <sup>2</sup>       | n41, n80                 |
| SUL_n41-n81 <sup>2</sup>       | n41, n81                 |
| SUL_n41-n83 <sup>2</sup>       | n41, n83                 |
| SUL_n41-n95 <sup>2</sup>       | n41, n95                 |
| SUL_n41-n97 <sup>2</sup>       | n41, n97                 |
| SUL_n41-n98 <sup>2</sup>       | n41, n98                 |
| SUL_n41-n99 <sup>2</sup>       | n41, n99                 |
| SUL_n48-n99 <sup>2</sup>       | n48, n99                 |
| SUL_n77-n80 <sup>2</sup>       | n77, n80                 |
| SUL_n77-n84 <sup>2</sup>       | n77, n84                 |

|                                                                                                                                                   |          |
|---------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| SUL_n77-n99 <sup>2</sup>                                                                                                                          | n77, n99 |
| SUL_n78-n80 <sup>2</sup>                                                                                                                          | n78, n80 |
| SUL_n78-n81 <sup>2</sup>                                                                                                                          | n78, n81 |
| SUL_n78-n82 <sup>2</sup>                                                                                                                          | n78, n82 |
| SUL_n78-n83 <sup>2</sup>                                                                                                                          | n78, n83 |
| SUL_n78-n84 <sup>2</sup>                                                                                                                          | n78, n84 |
| SUL_n78-n86 <sup>2</sup>                                                                                                                          | n78, n86 |
| SUL_n79-n80 <sup>2</sup>                                                                                                                          | n79, n80 |
| SUL_n79-n81 <sup>2</sup>                                                                                                                          | n79, n81 |
| SUL_n79-n83 <sup>2</sup>                                                                                                                          | n79, n83 |
| SUL_n79-n84 <sup>2</sup>                                                                                                                          | n79, n84 |
| SUL_n79-n95 <sup>2</sup>                                                                                                                          | n79, n95 |
| SUL_n79-n97 <sup>2</sup>                                                                                                                          | n79, n97 |
| SUL_n79-n98 <sup>2</sup>                                                                                                                          | n79, n98 |
| NOTE 1: If a UE is configured with both NR UL and NR SUL carriers in a cell, the switching time between NR UL carrier and NR SUL carrier is 0 us. |          |
| NOTE 2: For UE supporting SUL band combination simultaneous Rx/Tx capability is mandatory.                                                        |          |

Table 5.2C-2: Operating SUL band combination with intra-band non-contiguous CA in FR1

| NR Band combination for SUL                                                                                                                           | NR Band (Table 5.2-1) |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| CA_n41(*)-n99 <sup>2</sup>                                                                                                                            | n41, n99              |
| CA_n48(*)-n99 <sup>2</sup>                                                                                                                            | n48, n99              |
| CA_n77(*)-n99 <sup>2</sup>                                                                                                                            | n77, n99              |
| CA_n78(*)-n86 <sup>2</sup>                                                                                                                            | n78, n86              |
| NOTE 1: If a UE is configured with both NR UL and NR SUL carriers in a cell, the switching time between NR UL carrier and NR SUL carrier is 0 us.     |                       |
| NOTE 2: For UE supporting SUL band combination simultaneous Rx/Tx capability is mandatory.                                                            |                       |
| NOTE 3: The notation CA_nX(*) in this table indicates intra-band non-contiguous CA for band nX. The configurations for each band are in Table 5.5C-2. |                       |

Table 5.2C-3: Operating SUL band combination with intra-band contiguous CA in FR1

| NR Band combination for SUL                                                                                                                       | NR Band (Table 5.2-1) |
|---------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| CA_n41-n80                                                                                                                                        | n41, n80              |
| CA_n41-n83                                                                                                                                        | n41, n83              |
| CA_n41-n95                                                                                                                                        | n41, n95              |
| CA_n78-n80                                                                                                                                        | n78, n80              |
| CA_n78-n84                                                                                                                                        | n78, n84              |
| CA_n79-n80                                                                                                                                        | n79, n80              |
| CA_n79-n83                                                                                                                                        | n79, n83              |
| CA_n79-n95                                                                                                                                        | n79, n95              |
| NOTE 1: If a UE is configured with both NR UL and NR SUL carriers in a cell, the switching time between NR UL carrier and NR SUL carrier is 0 us. |                       |
| NOTE 2: For UE supporting SUL band combination simultaneous Rx/Tx capability is mandatory.                                                        |                       |

**Table 5.2C-4: Operating SUL band combination with inter-band CA in FR1**

| NR Band combination for SUL                                                                                                                       | NR Band (Table 5.2-1) |
|---------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| CA_n1_n78-n80                                                                                                                                     | n1, n78, n80          |
| CA_n1_n78-n84                                                                                                                                     | n1, n78, n84          |
| CA_n3_n41-n80                                                                                                                                     | n3, n41, n80          |
| CA_n3_n78-n80                                                                                                                                     | n3, n78, n80          |
| CA_n3_n79-n80                                                                                                                                     | n3, n79, n80          |
| CA_n28_n41-n83                                                                                                                                    | n28, n41, n83         |
| CA_n28_n79-n83                                                                                                                                    | n28, n79, n83         |
| CA_n41_n79-n80                                                                                                                                    | n41, n79, n80         |
| CA_n41_n79-n83                                                                                                                                    | n41, n79, n83         |
| CA_n41_n79-n97                                                                                                                                    | n41, n79, n97         |
| CA_n79_n41-n80                                                                                                                                    | n41, n79, n80         |
| CA_n79_n41-n83                                                                                                                                    | n41, n79, n83         |
| CA_n79_n41-n97                                                                                                                                    | n41, n79, n97         |
| CA_n28-n79_n41-n83                                                                                                                                | n28, n41, n79, n83    |
| CA_n28-n41_n79-n83                                                                                                                                | n28, n41, n79, n83    |
| NOTE 1: If a UE is configured with both NR UL and NR SUL carriers in a cell, the switching time between NR UL carrier and NR SUL carrier is 0 us. |                       |
| NOTE 2: For UE supporting SUL band combination simultaneous Rx/Tx capability is mandatory.                                                        |                       |

## 5.2D Operating bands for UL MIMO

NR is designed to support UL MIMO where all of the operating bands are in FR1 defined in Table 5.2D-1.

**Table 5.2D-1: NR operating bands for UL MIMO in FR1**

| NR operating band |
|-------------------|
| n1                |
| n2                |
| n3                |
| n7                |
| n24               |
| n25               |
| n30 <sup>1</sup>  |
| n34               |
| n38               |
| n39               |
| n40               |
| n41               |
| n46               |
| n48               |
| n66               |
| n70               |
| n71 <sup>2</sup>  |
| n77               |
| n78               |
| n79               |
| n80               |
| n84               |
| n95               |
| n96               |
| n97               |
| n98               |
| n99               |
| n102              |

NOTE 1: Uplink transmission is not allowed at this band for UE with external vehicle-mounted antennas.  
NOTE 2: UL MIMO is targeted for FWA form factor.

## 5.2E Operating band for V2X

### 5.2E.1 V2X operating bands

NR V2X is designed to operate in the operating bands in FR1 defined in Table 5.2E.1-1.

**Table 5.2E.1-1 V2X operating bands in FR1**

| V2X Operating Band                                                                                                                               | Sidelink (SL) Transmission operating band  | Sidelink (SL) Reception operating band     | Duplex Mode | Interface |
|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|--------------------------------------------|-------------|-----------|
|                                                                                                                                                  | F <sub>UL_low</sub> – F <sub>UL_high</sub> | F <sub>DL_low</sub> – F <sub>DL_high</sub> |             |           |
| n14 <sup>2</sup>                                                                                                                                 | 788 MHz – 798 MHz                          | 788 MHz – 798 MHz                          | HD          | PC5       |
| n38 <sup>1</sup>                                                                                                                                 | 2570 MHz – 2620 MHz                        | 2570 MHz – 2620 MHz                        | HD          | PC5       |
| n47                                                                                                                                              | 5855 MHz – 5925 MHz                        | 5855 MHz – 5925 MHz                        | HD          | PC5       |
| n79                                                                                                                                              | 4400 MHz – 5000 MHz                        | 4400 MHz – 5000 MHz                        | HD          | PC5       |
| Note 1: When this band is used for V2X SL service, the band is exclusively used for NR V2X in particular regions.                                |                                            |                                            |             |           |
| Note 2: When this band is used for public safety service, the NR band is operated with both in-coverage scenarios and out-of-coverage scenarios. |                                            |                                            |             |           |

### 5.2E.2 V2X operating bands for concurrent operation

NR V2X operation is designed to operate concurrent with NR uplink/downlink on the operating bands combinations listed in Table 5.2E.2-1 and Table 5.2E.2-2.

**Table 5.2E.2-1 Inter-band concurrent V2X operating bands**

| V2X concurrent operating Band | NR or V2X Operating Band | Interface |
|-------------------------------|--------------------------|-----------|
| V2X_n1-n47                    | n1                       | Uu        |
|                               | n47                      | PC5       |
| V2X_n5-n47                    | n5                       | Uu        |
|                               | n47                      | PC5       |
| V2X_n8-n47                    | n8                       | Uu        |
|                               | n47                      | PC5       |
| V2X_n39-n47                   | n39                      | Uu        |
|                               | n47                      | PC5       |
| V2X_n40-n47                   | n40                      | Uu        |
|                               | n47                      | PC5       |
| V2X_n41-n47                   | n41                      | Uu        |
|                               | n47                      | PC5       |
| V2X_n71-n47                   | n71                      | Uu        |
|                               | n47                      | PC5       |
| V2X_n78-n47                   | n78                      | Uu        |
|                               | n47                      | PC5       |
| V2X_n79-n47                   | n79                      | Uu        |
|                               | n47                      | PC5       |

**Table 5.2E.2-2 Intra-band concurrent V2X operating bands**

| V2X concurrent operating Band | NR or V2X Operating Band | Interface |
|-------------------------------|--------------------------|-----------|
| V2X_n79-n79                   | n79                      | Uu        |
|                               | n79                      | PC5       |

## 5.3 UE channel bandwidth

### 5.3.1 General

The UE channel bandwidth supports a single NR RF carrier in the uplink or downlink at the UE. From a BS perspective, different UE channel bandwidths may be supported within the same spectrum for transmitting to and receiving from UEs connected to the BS. Transmission of multiple carriers to the same UE (CA) or multiple carriers to different UEs within the BS channel bandwidth can be supported.

From a UE perspective, the UE is configured with one or more BWP / carriers, each with its own UE channel bandwidth. The UE does not need to be aware of the BS channel bandwidth or how the BS allocates bandwidth to different UEs.

The placement of the UE channel bandwidth for each UE carrier is flexible but can only be completely within the BS channel bandwidth.

The relationship between the channel bandwidth, the guardband and the maximum transmission bandwidth configuration is shown in Figure 5.3.1-1.

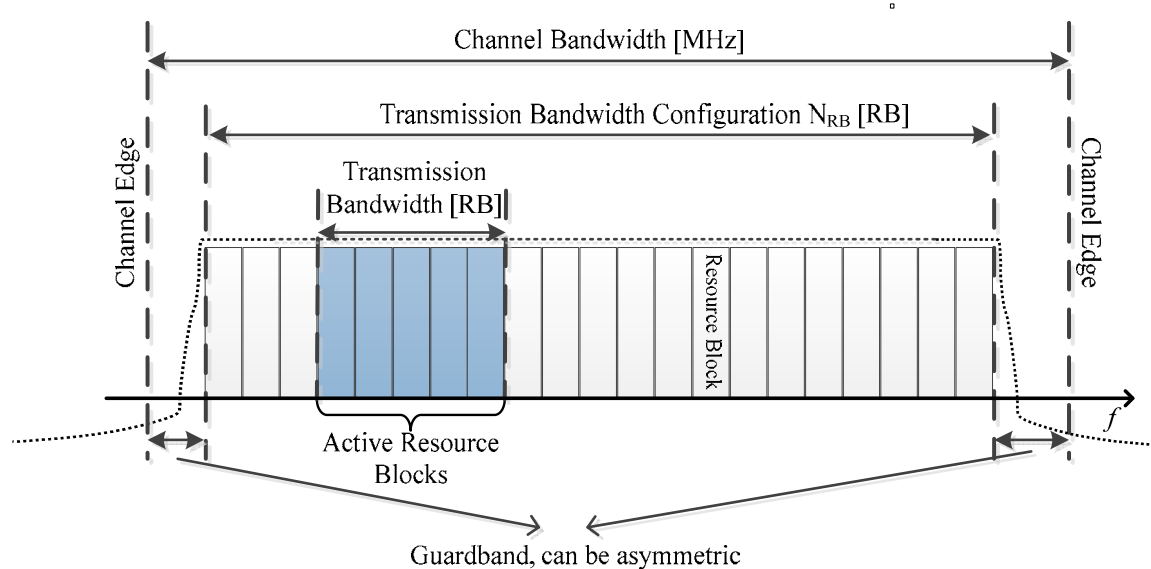


**Figure 5.3.1-1: Definition of the channel bandwidth and the maximum transmission bandwidth configuration for one NR channel**

5.3.2 Maximum transmission bandwidth configuration

The maximum transmission bandwidth configuration N<sub>RB</sub> for each UE channel bandwidth and subcarrier spacing is specified in Table 5.3.2-1.

Table 5.3.2-1: Maximum transmission bandwidth configuration N<sub>RB</sub>

| SCS<br>(kHz) | 5<br>MHz        | 10<br>MHz       | 15<br>MHz       | 20<br>MHz       | 25<br>MHz       | 30<br>MHz       | 35<br>MHz       | 40<br>MHz       | 45<br>MHz       | 50<br>MHz       | 60<br>MHz       | 70<br>MHz       | 80<br>MHz       | 90<br>MHz       | 100<br>MHz      |
|--------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|              | N <sub>RB</sub> | N <sub>RB</sub> | N <sub>RB</sub> | N <sub>RB</sub> | N <sub>RB</sub> | N <sub>RB</sub> | N <sub>RB</sub> | N <sub>RB</sub> | N <sub>RB</sub> | N <sub>RB</sub> | N <sub>RB</sub> | N <sub>RB</sub> | N <sub>RB</sub> | N <sub>RB</sub> | N <sub>RB</sub> |
| 15           | 25              | 52              | 79              | 106             | 133             | 160             | 188             | 216             | 242             | 270             | N/A             | N/A             | N/A             | N/A             | N/A             |
| 30           | 11              | 24              | 38              | 51              | 65              | 78              | 92              | 106             | 119             | 133             | 162             | 189             | 217             | 245             | 273             |
| 60           | N/A             | 11              | 18              | 24              | 31              | 38              | 44              | 51              | 58              | 65              | 79              | 93              | 107             | 121             | 135             |

5.3.3 Minimum guardband and transmission bandwidth configuration

The minimum guardband for each UE channel bandwidth and SCS is specified in Table 5.3.3-1,

Table 5.3.3-1: Minimum guardband for each UE channel bandwidth and SCS (kHz)

| SCS<br>(kHz) | 5<br>MHz | 10<br>MHz | 15<br>MHz | 20<br>MHz | 25<br>MHz | 30<br>MHz | 35<br>MHz | 40<br>MHz | 45<br>MHz | 50<br>MHz | 60<br>MHz | 70<br>MHz | 80<br>MHz | 90<br>MHz | 100<br>MHz |
|--------------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|
| 15           | 242.5    | 312.5     | 382.5     | 452.5     | 522.5     | 592.5     | 572.5     | 552.5     | 712.5     | 692.5     | N/A       | N/A       | N/A       | N/A       | N/A        |
| 30           | 505      | 665       | 645       | 805       | 785       | 945       | 925       | 905       | 1065      | 1045      | 825       | 965       | 925       | 885       | 845        |
| 60           | N/A      | 1010      | 990       | 1330      | 1310      | 1290      | 1630      | 1610      | 1590      | 1570      | 1530      | 1490      | 1450      | 1410      | 1370       |

NOTE: The minimum guardbands have been calculated using the following equation:  $GB_{channel} = (BW_{Channel} \times 1000 \text{ (kHz)} - N_{RB} \times SCS \times 12) / 2 - SCS/2$ , where N<sub>RB</sub> are from Table 5.3.2-1 and GB<sub>channel</sub> expressed in kHz.

Figure 5.3.3-1: Void

The number of RBs configured in any channel bandwidth shall ensure that the minimum guardband specified in this clause is met.

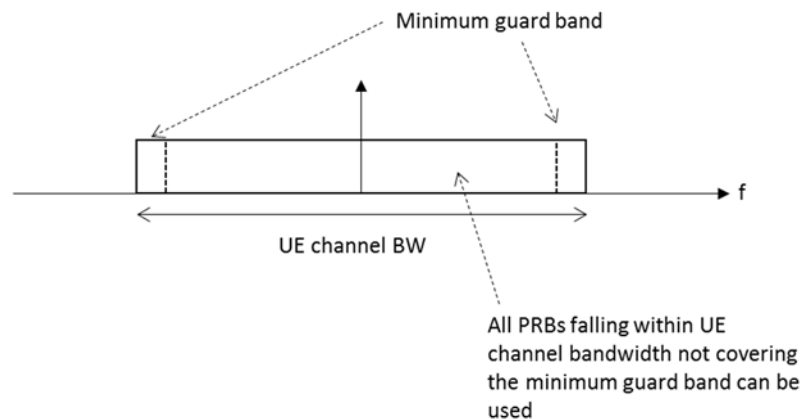


**Figure 5.3.3-2: UE PRB utilization**

In the case that multiple numerologies are multiplexed in the same symbol due to BS transmission of SSB, the minimum guardband on each side of the carrier is the guardband applied at the configured channel bandwidth for the numerology that is received immediately adjacent to the guard.

If multiple numerologies are multiplexed in the same symbol and the UE channel bandwidth is >50 MHz, the minimum guardband applied adjacent to 15 kHz SCS shall be the same as the minimum guardband defined for 30 kHz SCS for the same UE channel bandwidth.

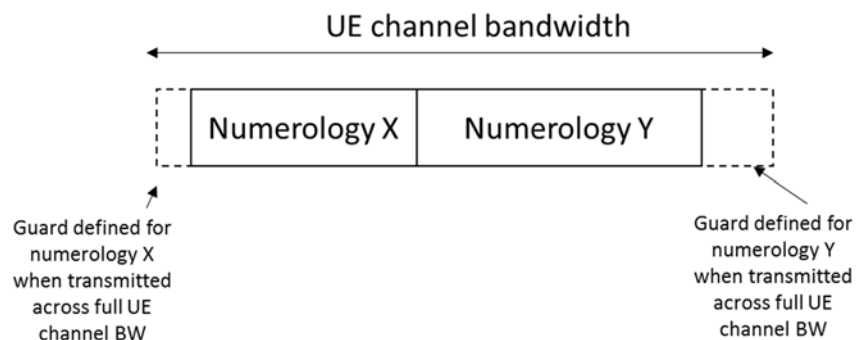


**Figure 5.3.3-3 Guard band definition when transmitting multiple numerologies**

NOTE: Figure 5.3.3-3 is not intended to imply the size of any guard between the two numerologies. Inter-numerology guard band within the carrier is implementation dependent.

For a UE supporting wideband operation, the nominal intra-cell guard bands and the corresponding sizes of the RB sets separated by the said guard bands are as specified in Table 5.3.3-2 for each UE channel bandwidth and sub-carrier spacing for the downlink and uplink. The nominal intra-cell guard bands in Table 5.3.3-2 are applicable when the respective IE *intraCellGuardBandsUL-List* and *intraCellGuardBandsDL-List* [7] for the uplink and downlink are not provided, as specified in [10] clause 7.

**Table 5.3.3-2: Nominal intra-cell guard bands for wideband operation**

| SCS (kHz) | 40 MHz    | 60 MHz | 80 MHz | 100 MHz |
|-----------|-----------|--------|--------|---------|
| 15        | 105-6-105 | N/A    | N/A    | N/A     |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                  |                       |                            |                                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-----------------------|----------------------------|---------------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | (216)            |                       |                            |                                 |
| 30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 50-6-50<br>(106) | 50-6-50-6-50<br>(162) | 50-6-50-5-50-6-50<br>(217) | 50-6-50-6-49-6-50-6-50<br>(273) |
| 60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 23-5-23<br>(51)  | 23-5-23-5-23<br>(79)  | 23-5-23-5-23-5-23<br>(107) | 23-5-23-5-23-5-23-5-23<br>(135) |
| NOTE 1: The intra-cell guard band is denoted $TBW_0-GB_0-...-GB_{N\_RBset-2}-TBW_{N\_RBset-1}$ for $N\_RBset > 1$ number of RB-sets with $TBW_r$ the maximum transmission bandwidth (PRB) of RB-set $r$ and $GB_r$ the guard band (PRB) above the upper edge of RB-set $r$ . The RB-set 0 is starting at the first common resource block (CRB) of the carrier as indicated by <i>offsetToCarrier</i> . The total transmission bandwidth configuration (size of resource grid) including guard bands is given in between parentheses. |                  |                       |                            |                                 |

For a UE that supports shared spectrum channel access, there are no uplink or downlink intra-cell guard bands for operation with 10 MHz and 20 MHz channel bandwidths; the maximum transmission bandwidth configurations for these channel bandwidths are in accordance with clause 5.3.2.

For each UE channel bandwidth and sub-carrier spacing given by Table 5.3.3-2, the maximum transmission bandwidth configuration of the carrier including intra-cell guard bands, if configured for the uplink and downlink by the respective IE *intraCellGuardBandsUL-List* and *intraCellGuardBandsDL-List* [7], and corresponding RB-set(s) shall be in accordance with clause 5.3.2 with a minimum inter-cell guard band of the UE channel bandwidth as specified in Table 5.3.3-1 for the uplink and downlink. Minimum requirements specified for wideband operation in Clause 6 and Clause 7 also apply for intra-cell guard bands larger than the nominal sizes in Table 5.3.3-2 as listed in Table 5.3.3-3 for each sub-carrier spacing; each guard band in order of CRB index must be larger than or equal to the corresponding nominal guard band specified in Table 5.3.3-2 for each channel bandwidth.

**Table 5.3.3-3: Applicable intra-cell guard bands for wideband operation**

| Parameter                               | Unit | SCS     |          |
|-----------------------------------------|------|---------|----------|
|                                         |      | 15 kHz  | 30 kHz   |
| Intra-cell guard band (size)            | PRB  | 6,7     | 5,6,7    |
| Transmission bandwidth (size) of RB-set | PRB  | 104,105 | 49,50,51 |

If the UE is configured with zero width intra-cell guard bands for the uplink and downlink by the IE *intraCellGuardBandsUL-List* and *intraCellGuardBandsDL-List* [7] on a carrier greater than 20 MHz, the maximum transmission bandwidth configuration for the uplink and downlink shall be in accordance with clause 5.3.2 with a minimum inter-cell guard band of the UE channel bandwidth as specified in Table 5.3.3-1.

### 5.3.4 RB alignment

For each numerology, its common resource blocks are specified in Clause 4.4.4.3 in TS 38.211 [6], and the starting point of its transmission bandwidth configuration on the common resource block grid for a given channel bandwidth is indicated by an offset to "Reference point A" in the unit of the numerology. The *UE transmission bandwidth configuration* is indicated by the higher layer parameter *carrierBandwidth* [7] and will fulfil the minimum UE guardband requirement specified in Clause 5.3.3.

### 5.3.5 UE channel bandwidth per operating band

The requirements in this specification apply to the combination of channel bandwidths, SCS and operating bands shown in Table 5.3.5-1. The transmission bandwidth configuration in Table 5.3.2-1 shall be supported for each of the specified channel bandwidths. The channel bandwidths are specified for both the TX and RX path.

**Table 5.3.5-1: Channel bandwidths for each NR band**

| NR Band | SCS (kHz) | UE Channel bandwidth (MHz) |    |    |    |    |    |                 |    |                 |    |    |    |    |    |     |
|---------|-----------|----------------------------|----|----|----|----|----|-----------------|----|-----------------|----|----|----|----|----|-----|
|         |           | 5                          | 10 | 15 | 20 | 25 | 30 | 35              | 40 | 45              | 50 | 60 | 70 | 80 | 90 | 100 |
| n1      | 15        | 5                          | 10 | 15 | 20 | 25 | 30 |                 | 40 | 45 <sup>4</sup> | 50 |    |    |    |    |     |
|         | 30        |                            | 10 | 15 | 20 | 25 | 30 |                 | 40 | 45 <sup>4</sup> | 50 |    |    |    |    |     |
|         | 60        |                            | 10 | 15 | 20 | 25 | 30 |                 | 40 | 45 <sup>4</sup> | 50 |    |    |    |    |     |
| n2      | 15        | 5                          | 10 | 15 | 20 | 25 | 30 | 35 <sup>4</sup> | 40 |                 |    |    |    |    |    |     |
|         | 30        |                            | 10 | 15 | 20 | 25 | 30 | 35 <sup>4</sup> | 40 |                 |    |    |    |    |    |     |



| NR Band           | SCS (kHz) | UE Channel bandwidth (MHz) |                 |    |                 |                 |                 |                   |    |                   |    |    |    |    |    |                  |
|-------------------|-----------|----------------------------|-----------------|----|-----------------|-----------------|-----------------|-------------------|----|-------------------|----|----|----|----|----|------------------|
|                   |           | 5                          | 10              | 15 | 20              | 25              | 30              | 35                | 40 | 45                | 50 | 60 | 70 | 80 | 90 | 100              |
| n3                | 60        |                            | 10              | 15 | 20              | 25              | 30              | 35 <sup>4</sup>   | 40 |                   |    |    |    |    |    |                  |
|                   | 15        | 5                          | 10              | 15 | 20              | 25              | 30              | 35 <sup>4</sup>   | 40 | 45 <sup>4</sup>   | 50 |    |    |    |    |                  |
|                   | 30        |                            | 10              | 15 | 20              | 25              | 30              | 35 <sup>4</sup>   | 40 | 45 <sup>4</sup>   | 50 |    |    |    |    |                  |
|                   | 60        |                            | 10              | 15 | 20              | 25              | 30              | 35 <sup>4</sup>   | 40 | 45 <sup>4</sup>   | 50 |    |    |    |    |                  |
| n5                | 15        | 5                          | 10              | 15 | 20              | 25 <sup>3</sup> |                 |                   |    |                   |    |    |    |    |    |                  |
|                   | 30        |                            | 10              | 15 | 20              | 25 <sup>3</sup> |                 |                   |    |                   |    |    |    |    |    |                  |
|                   | 60        |                            |                 |    |                 |                 |                 |                   |    |                   |    |    |    |    |    |                  |
| n7                | 15        | 5                          | 10              | 15 | 20              | 25              | 30              | 35 <sup>4</sup>   | 40 |                   | 50 |    |    |    |    |                  |
|                   | 30        |                            | 10              | 15 | 20              | 25              | 30              | 35 <sup>4</sup>   | 40 |                   | 50 |    |    |    |    |                  |
|                   | 60        |                            | 10              | 15 | 20              | 25              | 30              | 35 <sup>4</sup>   | 40 |                   | 50 |    |    |    |    |                  |
| n8                | 15        | 5                          | 10              | 15 | 20              |                 |                 | 35 <sup>3,4</sup> |    |                   |    |    |    |    |    |                  |
|                   | 30        |                            | 10              | 15 | 20              |                 |                 | 35 <sup>3,4</sup> |    |                   |    |    |    |    |    |                  |
|                   | 60        |                            |                 |    |                 |                 |                 |                   |    |                   |    |    |    |    |    |                  |
| n12               | 15        | 5                          | 10              | 15 |                 |                 |                 |                   |    |                   |    |    |    |    |    |                  |
|                   | 30        |                            | 10              | 15 |                 |                 |                 |                   |    |                   |    |    |    |    |    |                  |
|                   | 60        |                            |                 |    |                 |                 |                 |                   |    |                   |    |    |    |    |    |                  |
| n13               | 15        | 5                          | 10              |    |                 |                 |                 |                   |    |                   |    |    |    |    |    |                  |
|                   | 30        |                            | 10              |    |                 |                 |                 |                   |    |                   |    |    |    |    |    |                  |
|                   | 60        |                            |                 |    |                 |                 |                 |                   |    |                   |    |    |    |    |    |                  |
| n14 <sup>10</sup> | 15        | 5                          | 10              |    |                 |                 |                 |                   |    |                   |    |    |    |    |    |                  |
|                   | 30        |                            | 10              |    |                 |                 |                 |                   |    |                   |    |    |    |    |    |                  |
|                   | 60        |                            |                 |    |                 |                 |                 |                   |    |                   |    |    |    |    |    |                  |
| n18               | 15        | 5                          | 10              | 15 |                 |                 |                 |                   |    |                   |    |    |    |    |    |                  |
|                   | 30        |                            | 10              | 15 |                 |                 |                 |                   |    |                   |    |    |    |    |    |                  |
|                   | 60        |                            |                 |    |                 |                 |                 |                   |    |                   |    |    |    |    |    |                  |
| n20               | 15        | 5                          | 10              | 15 | 20              |                 |                 |                   |    |                   |    |    |    |    |    |                  |
|                   | 30        |                            | 10              | 15 | 20              |                 |                 |                   |    |                   |    |    |    |    |    |                  |
|                   | 60        |                            |                 |    |                 |                 |                 |                   |    |                   |    |    |    |    |    |                  |
| n24               | 15        | 5                          | 10              |    |                 |                 |                 |                   |    |                   |    |    |    |    |    |                  |
|                   | 30        |                            | 10              |    |                 |                 |                 |                   |    |                   |    |    |    |    |    |                  |
|                   | 60        |                            | 10              |    |                 |                 |                 |                   |    |                   |    |    |    |    |    |                  |
| n25               | 15        | 5                          | 10              | 15 | 20              | 25              | 30              | 35 <sup>4</sup>   | 40 | 45 <sup>3,4</sup> |    |    |    |    |    |                  |
|                   | 30        |                            | 10              | 15 | 20              | 25              | 30              | 35 <sup>4</sup>   | 40 | 45 <sup>3,4</sup> |    |    |    |    |    |                  |
|                   | 60        |                            | 10              | 15 | 20              | 25              | 30              | 35 <sup>4</sup>   | 40 | 45 <sup>3,4</sup> |    |    |    |    |    |                  |
| n26               | 15        | 5                          | 10              | 15 | 20              | 25 <sup>3</sup> | 30 <sup>3</sup> |                   |    |                   |    |    |    |    |    |                  |
|                   | 30        |                            | 10              | 15 | 20              | 25 <sup>3</sup> | 30 <sup>3</sup> |                   |    |                   |    |    |    |    |    |                  |
| n28               | 15        | 5                          | 10              | 15 | 20 <sup>7</sup> | 25 <sup>7</sup> | 30 <sup>7</sup> |                   |    |                   |    |    |    |    |    |                  |
|                   | 30        |                            | 10              | 15 | 20 <sup>7</sup> | 25 <sup>7</sup> | 30 <sup>7</sup> |                   |    |                   |    |    |    |    |    |                  |
|                   | 60        |                            |                 |    |                 |                 |                 |                   |    |                   |    |    |    |    |    |                  |
| n29               | 15        | 5                          | 10              |    |                 |                 |                 |                   |    |                   |    |    |    |    |    |                  |
|                   | 30        |                            | 10              |    |                 |                 |                 |                   |    |                   |    |    |    |    |    |                  |
|                   | 60        |                            |                 |    |                 |                 |                 |                   |    |                   |    |    |    |    |    |                  |
| n30               | 15        | 5                          | 10              |    |                 |                 |                 |                   |    |                   |    |    |    |    |    |                  |
|                   | 30        |                            | 10              |    |                 |                 |                 |                   |    |                   |    |    |    |    |    |                  |
|                   | 60        |                            |                 |    |                 |                 |                 |                   |    |                   |    |    |    |    |    |                  |
| n34               | 15        | 5                          | 10              | 15 |                 |                 |                 |                   |    |                   |    |    |    |    |    |                  |
|                   | 30        |                            | 10              | 15 |                 |                 |                 |                   |    |                   |    |    |    |    |    |                  |
|                   | 60        |                            | 10              | 15 |                 |                 |                 |                   |    |                   |    |    |    |    |    |                  |
| n38 <sup>10</sup> | 15        | 5                          | 10              | 15 | 20              | 25              | 30              |                   | 40 |                   |    |    |    |    |    |                  |
|                   | 30        |                            | 10              | 15 | 20              | 25              | 30              |                   | 40 |                   |    |    |    |    |    |                  |
|                   | 60        |                            | 10              | 15 | 20              | 25              | 30              |                   | 40 |                   |    |    |    |    |    |                  |
| n39               | 15        | 5                          | 10              | 15 | 20              | 25              | 30              |                   | 40 |                   |    |    |    |    |    |                  |
|                   | 30        |                            | 10              | 15 | 20              | 25              | 30              |                   | 40 |                   |    |    |    |    |    |                  |
|                   | 60        |                            | 10              | 15 | 20              | 25              | 30              |                   | 40 |                   |    |    |    |    |    |                  |
| n40               | 15        | 5 <sup>5</sup>             | 10              | 15 | 20              | 25              | 30              |                   | 40 |                   | 50 |    |    |    |    |                  |
|                   | 30        |                            | 10              | 15 | 20              | 25              | 30              |                   | 40 |                   | 50 | 60 | 70 | 80 | 90 | 100              |
|                   | 60        |                            | 10              | 15 | 20              | 25              | 30              |                   | 40 |                   | 50 | 60 | 70 | 80 | 90 | 100              |
| n41               | 15        | 5 <sup>4,11</sup>          | 10              | 15 | 20              | 25 <sup>4</sup> | 30              | 35 <sup>4</sup>   | 40 | 45 <sup>4</sup>   | 50 |    |    |    |    |                  |
|                   | 30        |                            | 10              | 15 | 20              | 25 <sup>4</sup> | 30              | 35 <sup>4</sup>   | 40 | 45 <sup>4</sup>   | 50 | 60 | 70 | 80 | 90 | 100              |
|                   | 60        |                            | 10              | 15 | 20              | 25 <sup>4</sup> | 30              | 35 <sup>4</sup>   | 40 | 45 <sup>4</sup>   | 50 | 60 | 70 | 80 | 90 | 100              |
| n46               | 15        |                            | 10 <sup>5</sup> |    | 20              |                 |                 |                   | 40 |                   |    |    |    |    |    |                  |
|                   | 30        |                            | 10 <sup>5</sup> |    | 20              |                 |                 |                   | 40 |                   |    | 60 |    | 80 |    | 100 <sup>4</sup> |
|                   | 60        |                            | 10 <sup>5</sup> |    | 20              |                 |                 |                   | 40 |                   |    | 60 |    | 80 |    | 100 <sup>4</sup> |

| NR Band           | SCS (kHz) | UE Channel bandwidth (MHz) |    |    |                 |                 |                 |                   |    |                 |                 |                 |                 |                 |                 |                  |
|-------------------|-----------|----------------------------|----|----|-----------------|-----------------|-----------------|-------------------|----|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|
|                   |           | 5                          | 10 | 15 | 20              | 25              | 30              | 35                | 40 | 45              | 50              | 60              | 70              | 80              | 90              | 100              |
| n47 <sup>10</sup> | 15        |                            | 10 |    | 20              |                 | 30              |                   | 40 |                 |                 |                 |                 |                 |                 |                  |
|                   | 30        |                            | 10 |    | 20              |                 | 30              |                   | 40 |                 |                 |                 |                 |                 |                 |                  |
|                   | 60        |                            | 10 |    | 20              |                 | 30              |                   | 40 |                 |                 |                 |                 |                 |                 |                  |
| n48               | 15        | 5 <sup>5</sup>             | 10 | 15 | 20              |                 | 30              |                   | 40 |                 | 50 <sup>6</sup> |                 |                 |                 |                 |                  |
|                   | 30        |                            | 10 | 15 | 20              |                 | 30              |                   | 40 |                 | 50 <sup>6</sup> | 60 <sup>6</sup> | 70 <sup>6</sup> | 80 <sup>6</sup> | 90 <sup>6</sup> | 100 <sup>6</sup> |
|                   | 60        |                            | 10 | 15 | 20              |                 | 30              |                   | 40 |                 | 50 <sup>6</sup> | 60 <sup>6</sup> | 70 <sup>6</sup> | 80 <sup>6</sup> | 90 <sup>6</sup> | 100 <sup>6</sup> |
| n50               | 15        | 5 <sup>5</sup>             | 10 | 15 | 20              |                 | 30              |                   | 40 |                 | 50              |                 |                 |                 |                 |                  |
|                   | 30        |                            | 10 | 15 | 20              |                 | 30              |                   | 40 |                 | 50              | 60              |                 | 80 <sup>3</sup> |                 |                  |
|                   | 60        |                            | 10 | 15 | 20              |                 | 30              |                   | 40 |                 | 50              | 60              |                 | 80 <sup>3</sup> |                 |                  |
| n51               | 15        | 5                          |    |    |                 |                 |                 |                   |    |                 |                 |                 |                 |                 |                 |                  |
|                   | 30        |                            |    |    |                 |                 |                 |                   |    |                 |                 |                 |                 |                 |                 |                  |
|                   | 60        |                            |    |    |                 |                 |                 |                   |    |                 |                 |                 |                 |                 |                 |                  |
| n53               | 15        | 5                          | 10 |    |                 |                 |                 |                   |    |                 |                 |                 |                 |                 |                 |                  |
|                   | 30        |                            | 10 |    |                 |                 |                 |                   |    |                 |                 |                 |                 |                 |                 |                  |
|                   | 60        |                            | 10 |    |                 |                 |                 |                   |    |                 |                 |                 |                 |                 |                 |                  |
| n65               | 15        | 5                          | 10 | 15 | 20              |                 |                 |                   |    |                 | 50              |                 |                 |                 |                 |                  |
|                   | 30        |                            | 10 | 15 | 20              |                 |                 |                   |    |                 | 50              |                 |                 |                 |                 |                  |
|                   | 60        |                            | 10 | 15 | 20              |                 |                 |                   |    |                 | 50              |                 |                 |                 |                 |                  |
| n66               | 15        | 5                          | 10 | 15 | 20              | 25              | 30              | 35 <sup>4</sup>   | 40 | 45 <sup>4</sup> |                 |                 |                 |                 |                 |                  |
|                   | 30        |                            | 10 | 15 | 20              | 25              | 30              | 35 <sup>4</sup>   | 40 | 45 <sup>4</sup> |                 |                 |                 |                 |                 |                  |
|                   | 60        |                            | 10 | 15 | 20              | 25              | 30              | 35 <sup>4</sup>   | 40 | 45 <sup>4</sup> |                 |                 |                 |                 |                 |                  |
| n67               | 15        | 5                          | 10 | 15 | 20              |                 |                 |                   |    |                 |                 |                 |                 |                 |                 |                  |
|                   | 30        |                            | 10 | 15 | 20              |                 |                 |                   |    |                 |                 |                 |                 |                 |                 |                  |
|                   | 60        |                            |    |    |                 |                 |                 |                   |    |                 |                 |                 |                 |                 |                 |                  |
| n70               | 15        | 5                          | 10 | 15 | 20 <sup>3</sup> | 25 <sup>3</sup> |                 |                   |    |                 |                 |                 |                 |                 |                 |                  |
|                   | 30        |                            | 10 | 15 | 20 <sup>3</sup> | 25 <sup>3</sup> |                 |                   |    |                 |                 |                 |                 |                 |                 |                  |
|                   | 60        |                            | 10 | 15 | 20 <sup>3</sup> | 25 <sup>3</sup> |                 |                   |    |                 |                 |                 |                 |                 |                 |                  |
| n71               | 15        | 5                          | 10 | 15 | 20              | 25 <sup>3</sup> | 30 <sup>3</sup> | 35 <sup>3,4</sup> |    |                 |                 |                 |                 |                 |                 |                  |
|                   | 30        |                            | 10 | 15 | 20              | 25 <sup>3</sup> | 30 <sup>3</sup> | 35 <sup>3,4</sup> |    |                 |                 |                 |                 |                 |                 |                  |
|                   | 60        |                            |    |    |                 |                 |                 |                   |    |                 |                 |                 |                 |                 |                 |                  |
| n74               | 15        | 5                          | 10 | 15 | 20              |                 |                 |                   |    |                 |                 |                 |                 |                 |                 |                  |
|                   | 30        |                            | 10 | 15 | 20              |                 |                 |                   |    |                 |                 |                 |                 |                 |                 |                  |
|                   | 60        |                            | 10 | 15 | 20              |                 |                 |                   |    |                 |                 |                 |                 |                 |                 |                  |
| n75               | 15        | 5                          | 10 | 15 | 20              | 25              | 30              |                   | 40 |                 | 50              |                 |                 |                 |                 |                  |
|                   | 30        |                            | 10 | 15 | 20              | 25              | 30              |                   | 40 |                 | 50              |                 |                 |                 |                 |                  |
|                   | 60        |                            | 10 | 15 | 20              | 25              | 30              |                   | 40 |                 | 50              |                 |                 |                 |                 |                  |
| n76               | 15        | 5                          |    |    |                 |                 |                 |                   |    |                 |                 |                 |                 |                 |                 |                  |
|                   | 30        |                            |    |    |                 |                 |                 |                   |    |                 |                 |                 |                 |                 |                 |                  |
|                   | 60        |                            |    |    |                 |                 |                 |                   |    |                 |                 |                 |                 |                 |                 |                  |
| n77               | 15        |                            | 10 | 15 | 20              | 25              | 30              |                   | 40 |                 | 50              |                 |                 |                 |                 |                  |
|                   | 30        |                            | 10 | 15 | 20              | 25              | 30              |                   | 40 |                 | 50              | 60              | 70              | 80              | 90              | 100              |
|                   | 60        |                            | 10 | 15 | 20              | 25              | 30              |                   | 40 |                 | 50              | 60              | 70              | 80              | 90              | 100              |
| n78               | 15        |                            | 10 | 15 | 20              | 25              | 30              |                   | 40 |                 | 50              |                 |                 |                 |                 |                  |
|                   | 30        |                            | 10 | 15 | 20              | 25              | 30              |                   | 40 |                 | 50              | 60              | 70              | 80              | 90              | 100              |
|                   | 60        |                            | 10 | 15 | 20              | 25              | 30              |                   | 40 |                 | 50              | 60              | 70              | 80              | 90              | 100              |
| n79 <sup>10</sup> | 15        |                            | 10 |    | 20              |                 | 30              |                   | 40 |                 | 50              |                 |                 |                 |                 |                  |
|                   | 30        |                            | 10 |    | 20              |                 | 30              |                   | 40 |                 | 50              | 60              | 70 <sup>4</sup> | 80              | 90              | 100              |
|                   | 60        |                            | 10 |    | 20              |                 | 30              |                   | 40 |                 | 50              | 60              | 70 <sup>4</sup> | 80              | 90              | 100              |
| n80               | 15        | 5                          | 10 | 15 | 20              | 25              | 30              |                   | 40 |                 |                 |                 |                 |                 |                 |                  |
|                   | 30        |                            | 10 | 15 | 20              | 25              | 30              |                   | 40 |                 |                 |                 |                 |                 |                 |                  |
|                   | 60        |                            | 10 | 15 | 20              | 25              | 30              |                   | 40 |                 |                 |                 |                 |                 |                 |                  |
| n81               | 15        | 5                          | 10 | 15 | 20              |                 |                 |                   |    |                 |                 |                 |                 |                 |                 |                  |
|                   | 30        |                            | 10 | 15 | 20              |                 |                 |                   |    |                 |                 |                 |                 |                 |                 |                  |
|                   | 60        |                            |    |    |                 |                 |                 |                   |    |                 |                 |                 |                 |                 |                 |                  |
| n82               | 15        | 5                          | 10 | 15 | 20              |                 |                 |                   |    |                 |                 |                 |                 |                 |                 |                  |
|                   | 30        |                            | 10 | 15 | 20              |                 |                 |                   |    |                 |                 |                 |                 |                 |                 |                  |
|                   | 60        |                            |    |    |                 |                 |                 |                   |    |                 |                 |                 |                 |                 |                 |                  |
| n83               | 15        | 5                          | 10 | 15 | 20 <sup>7</sup> | 25 <sup>7</sup> | 30 <sup>7</sup> |                   |    |                 |                 |                 |                 |                 |                 |                  |
|                   | 30        |                            | 10 | 15 | 20 <sup>7</sup> | 25 <sup>7</sup> | 30 <sup>7</sup> |                   |    |                 |                 |                 |                 |                 |                 |                  |
|                   | 60        |                            |    |    |                 |                 |                 |                   |    |                 |                 |                 |                 |                 |                 |                  |
| n84               | 15        | 5                          | 10 | 15 | 20              | 25              | 30              |                   | 40 |                 | 50              |                 |                 |                 |                 |                  |
|                   | 30        |                            | 10 | 15 | 20              | 25              | 30              |                   | 40 |                 | 50              |                 |                 |                 |                 |                  |
|                   | 60        |                            | 10 | 15 | 20              | 25              | 30              |                   | 40 |                 | 50              |                 |                 |                 |                 |                  |

| NR Band | SCS (kHz) | UE Channel bandwidth (MHz) |                 |    |    |                 |    |                 |    |                 |    |    |    |    |    |                  |
|---------|-----------|----------------------------|-----------------|----|----|-----------------|----|-----------------|----|-----------------|----|----|----|----|----|------------------|
|         |           | 5                          | 10              | 15 | 20 | 25              | 30 | 35              | 40 | 45              | 50 | 60 | 70 | 80 | 90 | 100              |
| n85     | 15        | 5                          | 10              | 15 |    |                 |    |                 |    |                 |    |    |    |    |    |                  |
|         | 30        |                            | 10              | 15 |    |                 |    |                 |    |                 |    |    |    |    |    |                  |
|         | 60        |                            |                 |    |    |                 |    |                 |    |                 |    |    |    |    |    |                  |
| n86     | 15        | 5                          | 10              | 15 | 20 |                 |    |                 | 40 |                 |    |    |    |    |    |                  |
|         | 30        |                            | 10              | 15 | 20 |                 |    |                 | 40 |                 |    |    |    |    |    |                  |
|         | 60        |                            | 10              | 15 | 20 |                 |    |                 | 40 |                 |    |    |    |    |    |                  |
| n89     | 15        | 5                          | 10              | 15 | 20 |                 |    |                 |    |                 |    |    |    |    |    |                  |
|         | 30        |                            | 10              | 15 | 20 |                 |    |                 |    |                 |    |    |    |    |    |                  |
|         | 60        |                            |                 |    |    |                 |    |                 |    |                 | 50 |    |    |    |    |                  |
| n90     | 15        | 5 <sup>4</sup>             | 10              | 15 | 20 | 25 <sup>4</sup> | 30 | 35 <sup>4</sup> | 40 | 45 <sup>4</sup> | 50 |    |    |    |    |                  |
|         | 30        |                            | 10              | 15 | 20 | 25 <sup>4</sup> | 30 | 35 <sup>4</sup> | 40 | 45 <sup>4</sup> | 50 | 60 | 70 | 80 | 90 | 100              |
|         | 60        |                            | 10              | 15 | 20 | 25 <sup>4</sup> | 30 | 35 <sup>4</sup> | 40 | 45 <sup>4</sup> | 50 | 60 | 70 | 80 | 90 | 100              |
| n91     | 15        | 5                          | 10 <sup>8</sup> |    |    |                 |    |                 |    |                 |    |    |    |    |    |                  |
|         | 30        |                            |                 |    |    |                 |    |                 |    |                 |    |    |    |    |    |                  |
|         | 60        |                            |                 |    |    |                 |    |                 |    |                 |    |    |    |    |    |                  |
| n92     | 15        | 5                          | 10              | 15 | 20 |                 |    |                 |    |                 |    |    |    |    |    |                  |
|         | 30        |                            | 10              | 15 | 20 |                 |    |                 |    |                 |    |    |    |    |    |                  |
|         | 60        |                            |                 |    |    |                 |    |                 |    |                 |    |    |    |    |    |                  |
| n93     | 15        | 5                          | 10 <sup>8</sup> |    |    |                 |    |                 |    |                 |    |    |    |    |    |                  |
|         | 30        |                            |                 |    |    |                 |    |                 |    |                 |    |    |    |    |    |                  |
|         | 60        |                            |                 |    |    |                 |    |                 |    |                 |    |    |    |    |    |                  |
| n94     | 15        | 5                          | 10              | 15 | 20 |                 |    |                 |    |                 |    |    |    |    |    |                  |
|         | 30        |                            | 10              | 15 | 20 |                 |    |                 |    |                 |    |    |    |    |    |                  |
|         | 60        |                            |                 |    |    |                 |    |                 |    |                 |    |    |    |    |    |                  |
| n95     | 15        | 5                          | 10              | 15 |    |                 |    |                 |    |                 |    |    |    |    |    |                  |
|         | 30        |                            | 10              | 15 |    |                 |    |                 |    |                 |    |    |    |    |    |                  |
|         | 60        |                            | 10              | 15 |    |                 |    |                 |    |                 |    |    |    |    |    |                  |
| n96     | 15        |                            |                 |    | 20 |                 |    |                 | 40 |                 |    |    |    |    |    |                  |
|         | 30        |                            |                 |    | 20 |                 |    |                 | 40 |                 |    | 60 |    | 80 |    | 100 <sup>4</sup> |
|         | 60        |                            |                 |    | 20 |                 |    |                 | 40 |                 |    | 60 |    | 80 |    | 100 <sup>4</sup> |
| n97     | 15        | 5                          | 10              | 15 | 20 | 25              | 30 |                 | 40 |                 | 50 |    |    |    |    |                  |
|         | 30        |                            | 10              | 15 | 20 | 25              | 30 |                 | 40 |                 | 50 | 60 | 70 | 80 | 90 | 100              |
|         | 60        |                            | 10              | 15 | 20 | 25              | 30 |                 | 40 |                 | 50 | 60 | 70 | 80 | 90 | 100              |
| n98     | 15        | 5                          | 10              | 15 | 20 | 25              | 30 |                 | 40 |                 |    |    |    |    |    |                  |
|         | 30        |                            | 10              | 15 | 20 | 25              | 30 |                 | 40 |                 |    |    |    |    |    |                  |
|         | 60        |                            | 10              | 15 | 20 | 25              | 30 |                 | 40 |                 |    |    |    |    |    |                  |
| n99     | 15        | 5                          | 10              |    |    |                 |    |                 |    |                 |    |    |    |    |    |                  |
|         | 30        |                            | 10              |    |    |                 |    |                 |    |                 |    |    |    |    |    |                  |
|         | 60        |                            | 10              |    |    |                 |    |                 |    |                 |    |    |    |    |    |                  |
| n100    | 15        | 5                          |                 |    |    |                 |    |                 |    |                 |    |    |    |    |    |                  |
|         | 30        |                            |                 |    |    |                 |    |                 |    |                 |    |    |    |    |    |                  |
|         | 60        |                            |                 |    |    |                 |    |                 |    |                 |    |    |    |    |    |                  |
| n101    | 15        | 5                          | 10              |    |    |                 |    |                 |    |                 |    |    |    |    |    |                  |
|         | 30        |                            | 10              |    |    |                 |    |                 |    |                 |    |    |    |    |    |                  |
|         | 60        |                            |                 |    |    |                 |    |                 |    |                 |    |    |    |    |    |                  |
| n102    | 15        |                            |                 |    | 20 |                 |    |                 | 40 |                 |    |    |    |    |    |                  |
|         | 30        |                            |                 |    | 20 |                 |    |                 | 40 |                 |    | 60 |    | 80 |    | 100 <sup>4</sup> |
|         | 60        |                            |                 |    | 20 |                 |    |                 | 40 |                 |    | 60 |    | 80 |    | 100 <sup>4</sup> |
| n104    | 15        |                            |                 |    | 20 |                 | 30 |                 | 40 |                 | 50 |    |    |    |    |                  |
|         | 30        |                            |                 |    | 20 |                 | 30 |                 | 40 |                 | 50 | 60 | 70 | 80 | 90 | 100              |
|         | 60        |                            |                 |    | 20 |                 | 30 |                 | 40 |                 | 50 | 60 | 70 | 80 | 90 | 100              |

NOTE 1: Void.

NOTE 2: Void.

NOTE 3: This UE channel bandwidth is applicable only to downlink.

NOTE 4: This UE channel bandwidth is optional in this release of the specification.

NOTE 5: For this bandwidth, the minimum requirements are restricted to operation when carrier is configured as an SCell part of DC or CA configuration.

NOTE 6: For this bandwidth, the minimum requirements are restricted to operation when carrier is configured as a downlink SCell part of CA configuration.

NOTE 7: For UEs supporting up to 30 MHz channel bandwidth, the minimum requirements are specified for any NR UL channel bandwidth confined to 703-733 MHz or 718-748 MHz

NOTE 8: This UE channel bandwidth is applicable only to uplink.

NOTE 9: Void.

NOTE 10: For this band, UE channel bandwidths which are applicable to sidelink operation are specified in Table 5.3E.1-1.

| NR Band | SCS (kHz) | UE Channel bandwidth (MHz) |    |    |    |    |    |    |    |    |    |    |    |    |    |     |
|---------|-----------|----------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|
|         |           | 5                          | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 60 | 70 | 80 | 90 | 100 |

NOTE 11: Not all frequency positions of 5 MHz carriers are possible due limitations of the SSB position relative to the 5 MHz channels. 5 MHz channels with  $F_c$  such that  $2499+N*1.2 \leq F_c < 2499.3+N*1.2$  MHz for  $0 \leq N < 157$  are not compatible with SSB positions and cannot be used for 5 MHz n41.

### 5.3.6 Asymmetric channel bandwidths

The UE channel bandwidth can be asymmetric in downlink and uplink. In asymmetric channel bandwidth operation, the narrower carrier shall be confined within the frequency range of the wider channel bandwidth.

In FDD, the confinement is defined as a maximum deviation to the Tx-Rx carrier center frequency separation (defined in Table 5.4.4-1) as following:

$$\Delta F_{\text{TX-RX}} = |(BW_{\text{DL}} - BW_{\text{UL}})/2|$$

The operating bands and supported asymmetric channel bandwidth combinations are defined in Table 5.3.6-1.

**Table 5.3.6-1: FDD asymmetric UL and DL channel bandwidth combinations**

| NR Band          | Channel bandwidths for UL (MHz) | Channel bandwidths for DL (MHz) | Asymmetric channel bandwidth combination set |
|------------------|---------------------------------|---------------------------------|----------------------------------------------|
| n5               | 20                              | 25                              | 0                                            |
| n8               | 20                              | 35                              | 0                                            |
| n24              | 10                              | 5                               | 0                                            |
| n25              | 40                              | 45                              | 0                                            |
| n26              | 20                              | 25, 30                          | 0                                            |
| n66              | 5, 10                           | 20, 40                          | 0                                            |
|                  | 20                              | 40                              |                                              |
|                  | 5, 10                           | 20, 25, 30, 40                  | 1                                            |
|                  | 20, 25, 30                      | 40                              |                                              |
| n70              | 5, 10                           | 15                              | 0                                            |
|                  | 5, 10, 15                       | 20, 25                          |                                              |
| n71              | 5                               | 10                              | 0                                            |
|                  | 10                              | 15                              |                                              |
|                  | 15                              | 20                              |                                              |
|                  | 5                               | 10                              | 1                                            |
|                  | 10                              | 15                              |                                              |
|                  | 15                              | 20                              |                                              |
|                  | 20                              | 35                              |                                              |
|                  | 20                              | 25, 30, 35                      | 2                                            |
| n91 <sup>1</sup> | 10                              | 5                               | 0                                            |
| n92 <sup>1</sup> | 5                               | 10, 15, 20                      | 0                                            |
|                  | 10                              | 15, 20                          |                                              |
| n93 <sup>1</sup> | 10                              | 5                               | 0                                            |
| n94 <sup>1</sup> | 5                               | 10, 15, 20                      | 0                                            |
|                  | 10                              | 15, 20                          |                                              |

NOTE 1: The assignment of the paired UL and DL channels are subject to a TX-RX separation as specified in clause 5.4.4.

NOTE 2: As indicated in TS38.306 [15], it is mandatory for UEs to support asymmetric channel BCS0 if there is an asymmetric BCS0 defined for the band.

In TDD, the operating bands and supported asymmetric channel bandwidth combinations are defined in Table 5.3.6-2.

**Table 5.3.6-2: TDD asymmetric UL and DL channel bandwidth combinations**

| NR Band | Channel bandwidths for UL (MHz) | Channel bandwidths for DL (MHz) | Asymmetric channel bandwidth combination set |
|---------|---------------------------------|---------------------------------|----------------------------------------------|
| n50     | 60                              | 80                              | 0                                            |

- NOTE 1: Both centre frequency and BWP-ID shall match between DL and UL carriers as defined in TS 38.331 [7] cl. 6.3.2 and TS 38.213 [8] clause 12.
- NOTE 2: In a case a UE is configured with a full width of BWP within both UL/ DL channels, the centre frequency of UL/ DL channels shall be same.
- NOTE 3: A position of Point A is common between UL and DL carriers as defined in TS 38.331 [7] cl. 6.3.2.

## 5.3A UE channel bandwidth for CA

### 5.3A.1 General

Figure 5.3A.1-1: Void

Figure 5.3A.1-2: Void

### 5.3A.2 Maximum transmission bandwidth configuration for CA

For carrier aggregation, the maximum transmission bandwidth configuration is defined per component carrier and the requirement is specified in clause 5.3.2.

### 5.3A.3 Minimum guardband and transmission bandwidth configuration for CA

For intra-band contiguous carrier aggregation, *Aggregated Channel Bandwidth* and *Guard Bands* are defined as follows, see Figure 5.3A.3-1.

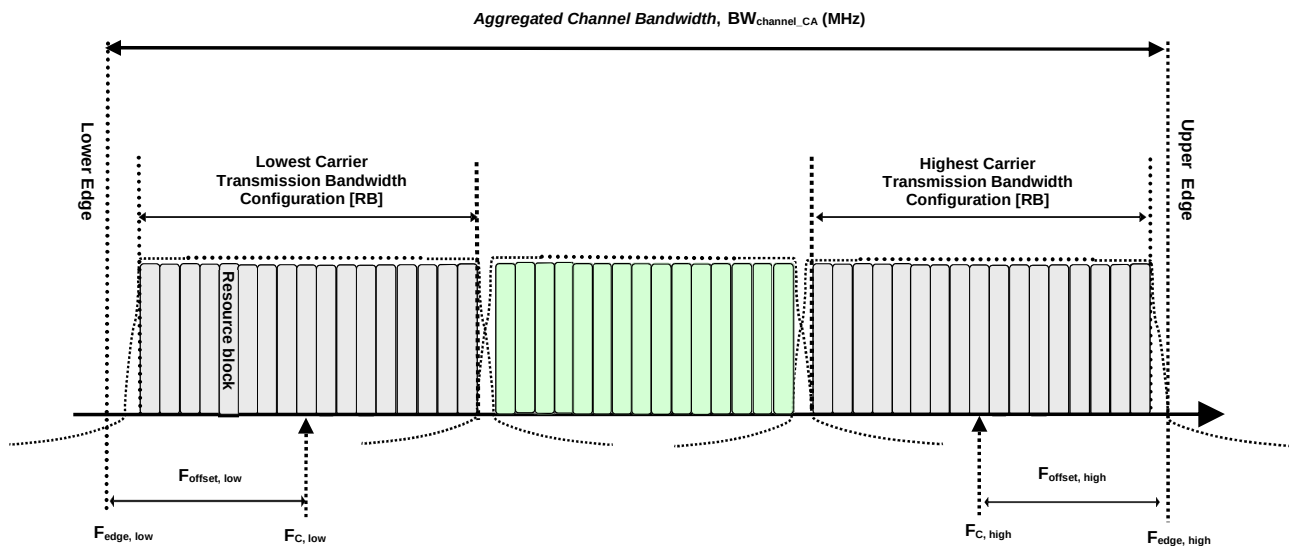


Figure 5.3A.3-1: Definition of *Aggregated Channel Bandwidth* for intra-band carrier aggregation

The *aggregated channel bandwidth*,  $BW_{\text{Channel\_CA}}$ , is defined as

$$BW_{\text{Channel\_CA}} = F_{\text{edge,high}} - F_{\text{edge,low}} \text{ (MHz)}.$$

The lower bandwidth edge  $F_{\text{edge,low}}$  and the upper bandwidth edge  $F_{\text{edge,high}}$  of the aggregated channel bandwidth are used as frequency reference points for transmitter and receiver requirements and are defined by

$$F_{\text{edge,low}} = F_{\text{C,low}} - F_{\text{offset,low}}$$

$$F_{\text{edge,high}} = F_{\text{C,high}} + F_{\text{offset,high}}$$

The lower and upper frequency offsets depend on the transmission bandwidth configurations of the lowest and highest assigned edge component carrier and are defined as

$$F_{\text{offset,low}} = (N_{\text{RB,low}} * 12 + 1) * \text{SCS}_{\text{low}} / 2 + \text{BW}_{\text{GB}} \text{ (MHz)}$$

$$F_{\text{offset,high}} = (N_{\text{RB,high}} * 12 - 1) * \text{SCS}_{\text{high}} / 2 + \text{BW}_{\text{GB}} \text{ (MHz)}$$

$$\text{BW}_{\text{GB}} = \max(\text{BW}_{\text{GB,Channel}(k)})$$

$N_{\text{RB,low}}$  and  $N_{\text{RB,high}}$  are the transmission bandwidth configurations according to Table 5.3.2-1 for the lowest and highest assigned component carrier,  $\text{SCS}_{\text{low}}$  and  $\text{SCS}_{\text{high}}$  are the sub-carrier spacing for the lowest and highest assigned component carrier respectively.  $\text{SCS}_{\text{low}}$ ,  $\text{SCS}_{\text{high}}$ ,  $N_{\text{RB,low}}$ ,  $N_{\text{RB,high}}$ , and  $\text{BW}_{\text{GB,Channel}(k)}$  use the largest  $\mu$  value among the subcarrier spacing configurations supported in the operating band for both of the channel bandwidths according to Table 5.3.5-1 and  $\text{BW}_{\text{GB,Channel}(k)}$  is the minimum guard band for carrier  $k$  according to Table 5.3.3-1 for the said  $\mu$  value.

In case there is no common  $\mu$  value for both of the channel bandwidths,  $\mu=1$  is used for  $\text{SCS}_{\text{low}}$ ,  $\text{SCS}_{\text{high}}$ ,  $N_{\text{RB,low}}$ ,  $N_{\text{RB,high}}$ , and  $\text{BW}_{\text{GB,Channel}(k)}$ .

For intra-band non-contiguous carrier aggregation *Sub-block Bandwidth* and *Sub-block edges* are defined as follows, see Figure 5.3A.3-2.

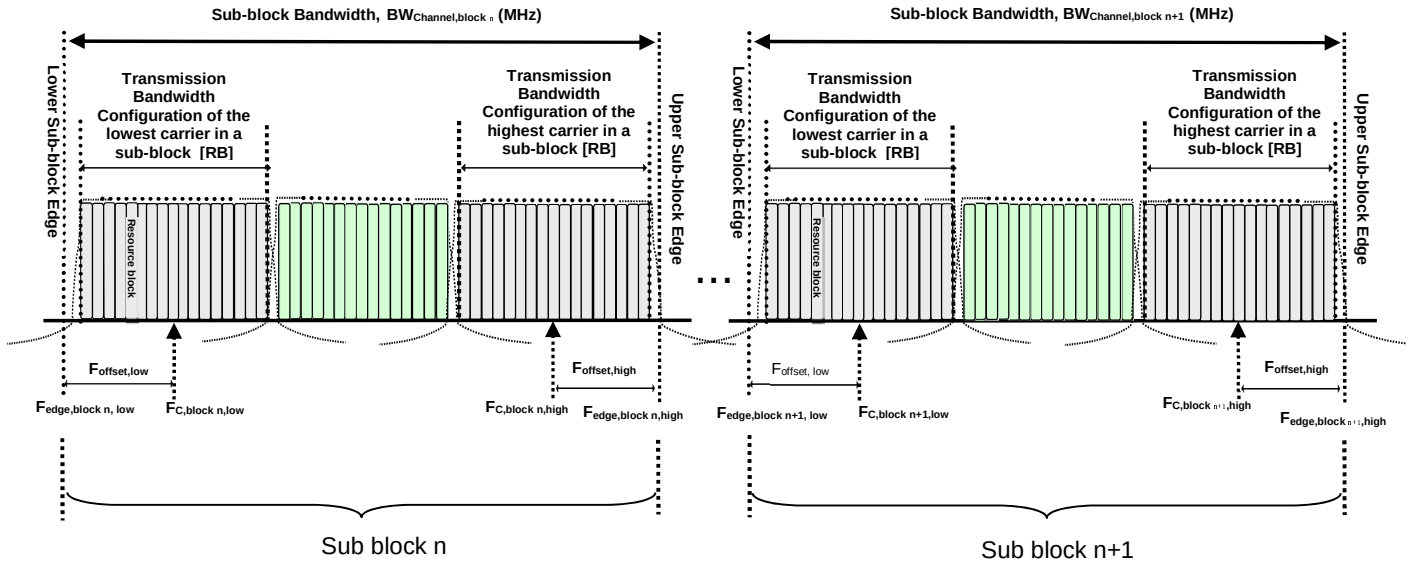


**Figure 5.3A.3-2: Definition of sub-block bandwidth for intra-band non-contiguous spectrum**

The lower sub-block edge of the Sub-block Bandwidth ( $\text{BW}_{\text{Channel,block}}$ ) is defined as

$$F_{\text{edge,block,low}} = F_{\text{C,block,low}} - F_{\text{offset,low}}$$

The upper sub-block edge of the Sub-block Bandwidth is defined as

$$F_{\text{edge,block,high}} = F_{\text{C,block,high}} + F_{\text{offset,high}}$$

The Sub-block Bandwidth,  $\text{BW}_{\text{Channel,block}}$ , is defined as follows:

$$\text{BW}_{\text{Channel,block}} = F_{\text{edge,block,high}} - F_{\text{edge,block,low}} \text{ (MHz)}$$

The lower and upper frequency offsets  $F_{\text{offset,block,low}}$  and  $F_{\text{offset,block,high}}$  depend on the transmission bandwidth configurations of the lowest and highest assigned edge component carriers within a sub-block and are defined as

$$F_{\text{offset,block,low}} = (N_{\text{RB,low}} * 12 + 1) * \text{SCS}_{\text{low}} / 2 + \text{BW}_{\text{GB}} \text{ (MHz)}$$

$$F_{\text{offset,block,high}} = (N_{\text{RB,high}} * 12 - 1) * \text{SCS}_{\text{high}} / 2 + \text{BW}_{\text{GB}} \text{ (MHz)}$$

$$\text{BW}_{\text{GB}} = \max(\text{BW}_{\text{GB,Channel}(k)})$$

where  $N_{\text{RB,low}}$  and  $N_{\text{RB,high}}$  are the transmission bandwidth configurations according to Table 5.3.2-1 for the lowest and highest assigned component carrier within a sub-block, respectively.  $\text{SCS}_{\text{low}}$  and  $\text{SCS}_{\text{high}}$  are the sub-carrier spacing for the lowest and highest assigned component carrier within a sub-block, respectively.  $\text{SCS}_{\text{low}}$ ,  $\text{SCS}_{\text{high}}$ ,  $N_{\text{RB,low}}$ ,  $N_{\text{RB,high}}$ ,

and  $BW_{GB,Channel(k)}$  use the largest  $\mu$  value among the subcarrier spacing configurations supported in the operating band for both of the channel bandwidths according to Table 5.3.5-1 and  $BW_{GB,Channel(k)}$  is the minimum guard band for carrier  $k$  according to Table 5.3.3-1 for the said  $\mu$  value. In case there is no common  $\mu$  value for both of the channel bandwidths,  $\mu=1$  is used for  $SCS_{low}$ ,  $SCS_{high}$ ,  $N_{RB,low}$ ,  $N_{RB,high}$ , and  $BW_{GB,Channel(k)}$ .

The sub-block gap size between two consecutive sub-blocks  $W_{gap}$  is defined as

$$W_{gap} = F_{edge,block\ n+1,low} - F_{edge,block\ n,high} \text{ (MHz)}$$

### 5.3A.4 Void

### 5.3A.5 UE channel bandwidth per operating band for CA

The requirements for carrier aggregation in this specification are defined for carrier aggregation configurations.

For intra-band contiguous carrier aggregation, a carrier aggregation configuration is a single operating band supporting a carrier aggregation bandwidth class with associated bandwidth combination sets specified in clause 5.5A.1. For each carrier aggregation configuration, requirements are specified for all aggregated channel bandwidths contained in a bandwidth combination set, a UE can indicate support of several bandwidth combination sets per carrier aggregation configuration. For intra-band non-contiguous carrier aggregation, a carrier aggregation configuration is a single operating band supporting two or more sub-blocks, each supporting a carrier aggregation bandwidth class.

For intra-band non-contiguous uplink carrier aggregation, frequency separation class ( $F_s$ ) specified in Table 5.3A.5-2 indicates the maximum frequency span between lower edge of lowest component carrier and upper edge of highest component carrier that UE can support per band combination in uplink in non-contiguous intra-band operation when the signalling is absent for dualPA-Architecture IE.

For inter-band carrier aggregation, a carrier aggregation configuration is a combination of operating bands, each supporting a carrier aggregation bandwidth class.

**Table 5.3A.5-1: NR CA bandwidth classes**

| NR CA bandwidth class | Aggregated channel bandwidth                                        | Number of contiguous CC | Fallback group       |
|-----------------------|---------------------------------------------------------------------|-------------------------|----------------------|
| A                     | $BW_{Channel} \leq BW_{Channel,max}$                                | 1                       | 1, 2, 3 <sup>4</sup> |
| B                     | $20 \text{ MHz} \leq BW_{Channel\_CA} \leq 100 \text{ MHz}$         | 2                       | 2, 3 <sup>4</sup>    |
| C                     | $100 \text{ MHz} < BW_{Channel\_CA} \leq 2 \times BW_{Channel,max}$ | 2                       | 1, 3 <sup>4</sup>    |
| D                     | $200 \text{ MHz} < BW_{Channel\_CA} \leq 3 \times BW_{Channel,max}$ | 3                       |                      |
| E                     | $300 \text{ MHz} < BW_{Channel\_CA} \leq 4 \times BW_{Channel,max}$ | 4                       |                      |
| G                     | $100 \text{ MHz} < BW_{Channel\_CA} \leq 150 \text{ MHz}$           | 3                       | 2                    |
| H                     | $150 \text{ MHz} < BW_{Channel\_CA} \leq 200 \text{ MHz}$           | 4                       |                      |
| I                     | $200 \text{ MHz} < BW_{Channel\_CA} \leq 250 \text{ MHz}$           | 5                       |                      |
| J                     | $250 \text{ MHz} < BW_{Channel\_CA} \leq 300 \text{ MHz}$           | 6                       |                      |
| K                     | $300 \text{ MHz} < BW_{Channel\_CA} \leq 350 \text{ MHz}$           | 7                       |                      |
| L                     | $350 \text{ MHz} < BW_{Channel\_CA} \leq 400 \text{ MHz}$           | 8                       | 3 <sup>4</sup>       |
| M <sup>3</sup>        | $50 \text{ MHz} \leq BW_{Channel\_CA} \leq 200 \text{ MHz}$         | 3                       |                      |
| N <sup>3</sup>        | $80 \text{ MHz} \leq BW_{Channel\_CA} \leq 300 \text{ MHz}$         | 4                       |                      |
| O <sup>3</sup>        | $100 \text{ MHz} \leq BW_{Channel\_CA} \leq 400 \text{ MHz}$        | 5                       |                      |

NOTE 1:  $BW_{Channel,max}$  is maximum channel bandwidth supported among all bands in a release

NOTE 2: It is mandatory for a UE to be able to fallback to lower order NR CA bandwidth class configuration within a fallback group. It is not mandatory for a UE to be able to fallback to lower order NR CA bandwidth class configuration that belong to a different fallback group.

NOTE 3: This bandwidth class is only applicable to bands identified for use with shared spectrum channel access in Table 5.2-1.

NOTE 4: Fallback group 3 is only applicable to bands identified for use with shared spectrum channel access in Table 5.2-1.

Table 5.3A.5-2: NR intra-band non-contiguous UL CA frequency separation classes

| NR NC UL CA frequency separation class | Maximum allowed frequency separation |
|----------------------------------------|--------------------------------------|
| I                                      | 100 MHz                              |
| II                                     | 200 MHz                              |
| III                                    | [600MHz]                             |

5.3E Channel bandwidth for V2X

5.3E.1 General

NR V2X operation channel bandwidths for each operating band are specified in Table 5.3E.1-1. The same (symmetrical) channel bandwidth is specified for both the transmission and reception path. The maximum channel bandwidth for SL operation in licensed band is 40MHz.

Table 5.3E.1-1 NR V2X operation channel bandwidths for each operating band

| NR band / SCS / UE Channel bandwidth (MHz) |           |   |    |    |    |    |
|--------------------------------------------|-----------|---|----|----|----|----|
| NR Band                                    | SCS (kHz) | 5 | 10 | 20 | 30 | 40 |
| n14                                        | 15        | 5 | 10 |    |    |    |
|                                            | 30        |   | 10 |    |    |    |
|                                            | 60        |   |    |    |    |    |
| n38                                        | 15        |   | 10 | 20 | 30 | 40 |
|                                            | 30        |   | 10 | 20 | 30 | 40 |
|                                            | 60        |   | 10 | 20 | 30 | 40 |
| n47                                        | 15        |   | 10 | 20 | 30 | 40 |
|                                            | 30        |   | 10 | 20 | 30 | 40 |
|                                            | 60        |   | 10 | 20 | 30 | 40 |
| n79                                        | 15        |   | 10 | 20 | 30 | 40 |
|                                            | 30        |   | 10 | 20 | 30 | 40 |
|                                            | 60        |   | 10 | 20 | 30 | 40 |



## 5.3E.2 Channel bandwidth for V2X concurrent operation

For NR V2X inter-band concurrent operation in FR1, the NR V2X channel bandwidths for each operating band are specified in Table 5.3E.2-1.

**Table 5.3E.2-1: Inter-band concurrent operation configurations**

| NR V2X inter-band concurrent operating configuration                           | NR Band | Interface | Channel bandwidth (MHz) (NOTE 1)                | NR V2X inter-band concurrent operating configuration |
|--------------------------------------------------------------------------------|---------|-----------|-------------------------------------------------|------------------------------------------------------|
| V2X_n1A-n47A                                                                   | n1      | Uu        | 5, 10, 15, 20, 25, 30, 40, 45, 50               | 0                                                    |
|                                                                                | n47     | PC5       | 10, 20, 30, 40                                  |                                                      |
| V2X_n5A-n47A                                                                   | n5      | Uu        | 5, 10, 15, 20, 25                               | 0                                                    |
|                                                                                | n47     | PC5       | 10, 20, 30, 40                                  |                                                      |
| V2X_n8A-n47A                                                                   | n8      | Uu        | 5, 10, 15, 20, 35                               | 0                                                    |
|                                                                                | n47     | PC5       | 10, 20, 30, 40                                  |                                                      |
| V2X_n39A-n47A                                                                  | n39     | Uu        | 5, 10, 15, 20, 25, 30, 40                       | 0                                                    |
|                                                                                | n47     | PC5       | 10, 20, 30, 40                                  |                                                      |
| V2X_n40A-n47A                                                                  | n40     | Uu        | 5, 10, 15, 20, 25, 30, 40, 50, 60, 80           | 0                                                    |
|                                                                                | n47     | PC5       | 10, 20, 30, 40                                  |                                                      |
| V2X_n41A-n47A                                                                  | n41     | Uu        | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100     | 0                                                    |
|                                                                                | n47     | PC5       | 10, 20, 30, 40                                  |                                                      |
| V2X_n71A-n47A                                                                  | n71     | Uu        | 5, 10, 15, 20                                   | 0                                                    |
|                                                                                | n47     | PC5       | 10, 20, 30, 40                                  |                                                      |
| V2X_n78A-n47A                                                                  | n78     | Uu        | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 0                                                    |
|                                                                                | n47     | PC5       | 10, 20, 30, 40                                  |                                                      |
| V2X_n79A-n47A                                                                  | n79     | Uu        | 40, 50, 60, 80, 100                             | 0                                                    |
|                                                                                | n47     | PC5       | 10, 20, 30, 40                                  |                                                      |
| NOTE 1: The SCS of each channel bandwidth for NR band refers to Table 5.3.5-1. |         |           |                                                 |                                                      |

For NR V2X intra-band concurrent operation in FR1, the NR V2X channel bandwidths for each operating band are specified in Table 5.3E.2-2.

**Table 5.3E.2-2: Intra-band concurrent operation configurations**

| NR V2X intra-band concurrent operating configuration                           | NR Band | Interface | Channel bandwidth (MHz) (NOTE 1) | NR V2X intra-band concurrent operating configuration |
|--------------------------------------------------------------------------------|---------|-----------|----------------------------------|------------------------------------------------------|
| V2X_n79B                                                                       | n79     | Uu        | 40, 50, 60, 80, 100              | 0                                                    |
|                                                                                | n79     | PC5       | 10, 20, 30, 40                   |                                                      |
| NOTE 1: The SCS of each channel bandwidth for NR band refers to Table 5.3.5-1. |         |           |                                  |                                                      |

## 5.3I Channel bandwidth for RedCap

The requirements in this specification apply to the combination of channel bandwidths, SCS and operating bands shown in Table 5.3.5-1 with maximum channel bandwidth of 20MHz. The transmission bandwidth configuration in Table 5.3.2-1 shall be supported for each of the specified channel bandwidths up to 20 MHz. The channel bandwidths are specified for both the TX and RX path.

## 5.4 Channel arrangement

### 5.4.1 Channel spacing

#### 5.4.1.1 Channel spacing for adjacent NR carriers

The spacing between carriers will depend on the deployment scenario, the size of the frequency block available and the channel bandwidths. The nominal channel spacing between two adjacent NR carriers is defined as following:

- For NR operating bands with 100 kHz channel raster,

$$\text{Nominal Channel spacing} = (\text{BW}_{\text{Channel}(1)} + \text{BW}_{\text{Channel}(2)})/2$$

- For NR operating bands with 15 kHz channel raster,

$$\text{Nominal Channel spacing} = (\text{BW}_{\text{Channel}(1)} + \text{BW}_{\text{Channel}(2)})/2 + \{-5 \text{ kHz}, 0 \text{ kHz}, 5 \text{ kHz}\} \text{ for } \Delta F_{\text{Raster}} \text{ equals } 15 \text{ kHz}$$

$$\text{Nominal Channel spacing} = (\text{BW}_{\text{Channel}(1)} + \text{BW}_{\text{Channel}(2)})/2 + \{-10 \text{ kHz}, 0 \text{ kHz}, 10 \text{ kHz}\} \text{ for } \Delta F_{\text{Raster}} \text{ equals } 30 \text{ kHz}$$

where  $\text{BW}_{\text{Channel}(1)}$  and  $\text{BW}_{\text{Channel}(2)}$  are the channel bandwidths of the two respective NR carriers. The channel spacing can be adjusted depending on the channel raster to optimize performance in a particular deployment scenario.

For NR bands restricted to operation with shared-spectrum channel access, the maximum deviation from the nominal channel spacing is 40 kHz.

### 5.4.2 Channel raster

#### 5.4.2.1 NR-ARFCN and channel raster

The global frequency channel raster defines a set of RF reference frequencies  $F_{\text{REF}}$ . The RF reference frequency is used in signalling to identify the position of RF channels, SS blocks and other elements.

The global frequency raster is defined for all frequencies from 0 to 100 GHz. The granularity of the global frequency raster is  $\Delta F_{\text{Global}}$ .

RF reference frequencies are designated by an NR Absolute Radio Frequency Channel Number (NR-ARFCN) in the range (0...2016666) on the global frequency raster. The relation between the NR-ARFCN and the RF reference frequency  $F_{\text{REF}}$  in MHz is given by the following equation, where  $F_{\text{REF-Offs}}$  and  $N_{\text{Ref-Offs}}$  are given in Table 5.4.2.1-1 and  $N_{\text{REF}}$  is the NR-ARFCN.

$$F_{\text{REF}} = F_{\text{REF-Offs}} + \Delta F_{\text{Global}} (N_{\text{REF}} - N_{\text{REF-Offs}})$$

**Table 5.4.2.1-1: NR-ARFCN parameters for the global frequency raster**

| Frequency range (MHz) | $\Delta F_{\text{Global}}$ (kHz) | $F_{\text{REF-Offs}}$ (MHz) | $N_{\text{REF-Offs}}$ | Range of $N_{\text{REF}}$ |
|-----------------------|----------------------------------|-----------------------------|-----------------------|---------------------------|
| 0 – 3000              | 5                                | 0                           | 0                     | 0 – 599999                |
| 3000 – 24250          | 15                               | 3000                        | 600000                | 600000 – 2016666          |

The channel raster defines a subset of RF reference frequencies that can be used to identify the RF channel position in the uplink and downlink. The RF reference frequency for an RF channel maps to a resource element on the carrier. For each operating band, a subset of frequencies from the global frequency raster are applicable for that band and forms a channel raster with a granularity  $\Delta F_{\text{Raster}}$ , which may be equal to or larger than  $\Delta F_{\text{Global}}$ .

For SUL bands except n95, n97, n98 and for the uplink of all FDD bands defined in Table 5.2-1, and for TDD bands n34, n39, n48, n90, n38 and n40

$$F_{\text{REF, shift}} = F_{\text{REF}} + \Delta_{\text{shift}}, \Delta_{\text{shift}} = 0 \text{ kHz or } 7.5 \text{ kHz.}$$

where  $\Delta_{\text{shift}}$  is signalled by the network in higher layer parameter *frequencyShift7p5khz* [7]. For Band n34, n38, n39, n40, n48  $F_{\text{REF, shift}}$  is only applicable to uplink transmissions using a 15 kHz SCS.

The mapping between the channel raster and corresponding resource element is given in Clause 5.4.2.2. The applicable entries for each operating band are defined in Clause 5.4.2.3.

### 5.4.2.2 Channel raster to resource element mapping

The mapping between the RF reference frequency on the channel raster and the corresponding resource element is given in Table 5.4.2.2-1 and can be used to identify the RF channel position. The mapping depends on the total number of RBs that are allocated in the channel and applies to both UL and DL. The mapping must apply to at least one numerology supported by the UE.

**Table 5.4.2.2-1: Channel raster to resource element mapping**

|                                                | $N_{\text{RB}} \bmod 2 = 0$                                           | $N_{\text{RB}} \bmod 2 = 1$                                           |
|------------------------------------------------|-----------------------------------------------------------------------|-----------------------------------------------------------------------|
| Resource element index $k$                     | 0                                                                     | 6                                                                     |
| Physical resource block index $n_{\text{PRB}}$ | $n_{\text{PRB}} = \left\lfloor \frac{N_{\text{RB}}}{2} \right\rfloor$ | $n_{\text{PRB}} = \left\lfloor \frac{N_{\text{RB}}}{2} \right\rfloor$ |

$N_{\text{RB}}$  is the maximum transmission bandwidth configuration specified in sub-clause 5.3.2,  $n_{\text{PRB}}$  is the PRB index within the  $N_{\text{RB}}$ , and  $k$  is the resource element index within this PRB.

### 5.4.2.3 Channel raster entries for each operating band

The RF channel positions on the channel raster in each NR operating band are given through the applicable NR-ARFCN in Table 5.4.2.3-1, using the channel raster to resource element mapping in clause 5.4.2.2.

For NR operating bands with 100 kHz channel raster,  $\Delta F_{\text{Raster}} = 20 \times \Delta F_{\text{Global}}$ . In this case every 20<sup>th</sup> NR-ARFCN within the operating band are applicable for the channel raster within the operating band and the step size for the channel raster in Table 5.4.2.3-1 is given as <20>.

For NR operating bands with 15 kHz channel raster below 3GHz,  $\Delta F_{\text{Raster}} = I \times \Delta F_{\text{Global}}$ , where  $I \in \{3,6\}$ . Every  $I^{\text{th}}$  NR-ARFCN within the operating band are applicable for the channel raster within the operating band and the step size for the channel raster in Table 5.4.2.3-1 is given as < $I$ >.

For NR operating bands with 15 kHz channel raster above 3GHz,  $\Delta F_{\text{Raster}} = I \times \Delta F_{\text{Global}}$ , where  $I \in \{1,2\}$ . Every  $I^{\text{th}}$  NR-ARFCN within the operating band are applicable for the channel raster within the operating band and the step size for the channel raster in Table 5.4.2.3-1 is given as < $I$ >.

In frequency bands with two or more  $\Delta F_{\text{Raster}}$ , the higher  $\Delta F_{\text{Raster}}$ : For 15 kHz and 30 kHz channel raster applies to channels using only the SCS that is equal to or larger than the higher  $\Delta F_{\text{Raster}}$  and SSB SCS is equal to the higher  $\Delta F_{\text{Raster}}$ .

**Table 5.4.2.3-1: Applicable NR-ARFCN per operating band**

| NR operating band | $\Delta F_{\text{Raster}}$ (kHz) | Uplink Range of $N_{\text{REF}}$ (First – <Step size> – Last) | Downlink Range of $N_{\text{REF}}$ (First – <Step size> – Last) |
|-------------------|----------------------------------|---------------------------------------------------------------|-----------------------------------------------------------------|
| n1                | 100                              | 384000 – <20> – 396000                                        | 422000 – <20> – 434000                                          |

| NR operating band | $\Delta F_{\text{Raster}}$ (kHz) | Uplink Range of $N_{\text{REF}}$ (First – <Step size> – Last) | Downlink Range of $N_{\text{REF}}$ (First – <Step size> – Last) |
|-------------------|----------------------------------|---------------------------------------------------------------|-----------------------------------------------------------------|
| n2                | 100                              | 370000 – <20> – 382000                                        | 386000 – <20> – 398000                                          |
| n3                | 100                              | 342000 – <20> – 357000                                        | 361000 – <20> – 376000                                          |
| n5                | 100                              | 164800 – <20> – 169800                                        | 173800 – <20> – 178800                                          |
| n7                | 100                              | 500000 – <20> – 514000                                        | 524000 – <20> – 538000                                          |
| n8                | 100                              | 176000 – <20> – 183000                                        | 185000 – <20> – 192000                                          |
| n12               | 100                              | 139800 – <20> – 143200                                        | 145800 – <20> – 149200                                          |
| n13               | 100                              | 155400 – <20> – 157400                                        | 149200 – <20> – 151200                                          |
| n14               | 100                              | 157600 – <20> – 159600                                        | 151600 – <20> – 153600                                          |
| n18               | 100                              | 163000 – <20> – 166000                                        | 172000 – <20> – 175000                                          |
| n20               | 100                              | 166400 – <20> – 172400                                        | 158200 – <20> – 164200                                          |
| n24               | 100                              | 325300 – <20> – 332100                                        | 305000 – <20> – 311800                                          |
| n25               | 100                              | 370000 – <20> – 383000                                        | 386000 – <20> – 399000                                          |
| n26               | 100                              | 162800 – <20> – 169800                                        | 171800 – <20> – 178800                                          |
| n28               | 100                              | 140600 – <20> – 149600                                        | 151600 – <20> – 160600                                          |
| n29               | 100                              | N/A                                                           | 143400 – <20> – 145600                                          |
| n30               | 100                              | 461000 – <20> – 463000                                        | 470000 – <20> – 472000                                          |
| n34               | 100                              | 402000 – <20> – 405000                                        | 402000 – <20> – 405000                                          |
| n38               | 100                              | 514000 – <20> – 524000                                        | 514000 – <20> – 524000                                          |
| n39               | 100                              | 376000 – <20> – 384000                                        | 376000 – <20> – 384000                                          |
| n40               | 100                              | 460000 – <20> – 480000                                        | 460000 – <20> – 480000                                          |
| n41               | 15                               | 499200 – <3> – 537999                                         | 499200 – <3> – 537999                                           |
|                   | 30                               | 499200 – <6> – 537996                                         | 499200 – <6> – 537996                                           |
| n46 <sup>2</sup>  | 15                               | 743334 – <1> – 795000                                         | 743334 – <1> – 795000                                           |
| n47               | 15                               | 790334 – <1> – 795000                                         | 790334 – <1> – 795000                                           |
| n48               | 15                               | 636667 – <1> – 646666                                         | 636667 – <1> – 646666                                           |
|                   | 30                               | 636668 – <2> – 646666                                         | 636668 – <2> – 646666                                           |
| n50               | 100                              | 286400 – <20> – 303400                                        | 286400 – <20> – 303400                                          |
| n51               | 100                              | 285400 – <20> – 286400                                        | 285400 – <20> – 286400                                          |
| n53               | 100                              | 496700 – <20> – 499000                                        | 496700 – <20> – 499000                                          |
| n65               | 100                              | 384000 – <20> – 402000                                        | 422000 – <20> – 440000                                          |
| n66               | 100                              | 342000 – <20> – 356000                                        | 422000 – <20> – 440000                                          |
| n67               | 100                              | N/A                                                           | 147600 – <20> – 151600                                          |
| n70               | 100                              | 339000 – <20> – 342000                                        | 399000 – <20> – 404000                                          |
| n71               | 100                              | 132600 – <20> – 139600                                        | 123400 – <20> – 130400                                          |
| n74               | 100                              | 285400 – <20> – 294000                                        | 295000 – <20> – 303600                                          |
| n75               | 100                              | N/A                                                           | 286400 – <20> – 303400                                          |
| n76               | 100                              | N/A                                                           | 285400 – <20> – 286400                                          |
| n77               | 15                               | 620000 – <1> – 680000                                         | 620000 – <1> – 680000                                           |
|                   | 30                               | 620000 – <2> – 680000                                         | 620000 – <2> – 680000                                           |
| n78               | 15                               | 620000 – <1> – 653333                                         | 620000 – <1> – 653333                                           |
|                   | 30                               | 620000 – <2> – 653332                                         | 620000 – <2> – 653332                                           |
| n79               | 15                               | 693334 – <1> – 733333                                         | 693334 – <1> – 733333                                           |
|                   | 30                               | 693334 – <2> – 733332                                         | 693334 – <2> – 733332                                           |
| n80               | 100                              | 342000 – <20> – 357000                                        | N/A                                                             |
| n81               | 100                              | 176000 – <20> – 183000                                        | N/A                                                             |
| n82               | 100                              | 166400 – <20> – 172400                                        | N/A                                                             |
| n83               | 100                              | 140600 – <20> – 149600                                        | N/A                                                             |
| n84               | 100                              | 384000 – <20> – 396000                                        | N/A                                                             |
| n85               | 100                              | 139600 – <20> – 143200                                        | 145600 – <20> – 149200                                          |
| n86               | 100                              | 342000 – <20> – 356000                                        | N/A                                                             |
| n89               | 100                              | 164800 – <20> – 169800                                        | N/A                                                             |
| n90               | 15                               | 499200 – <3> – 537999                                         | 499200 – <3> – 537999                                           |
|                   | 30                               | 499200 – <6> – 537996                                         | 499200 – <6> – 537996                                           |
|                   | 100                              | 499200 – <20> – 538000                                        | 499200 – <20> – 538000                                          |
| n91               | 100                              | 166400 – <20> – 172400                                        | 285400 – <20> – 286400                                          |
| n92               | 100                              | 166400 – <20> – 172400                                        | 286400 – <20> – 303400                                          |
| n93               | 100                              | 176000 – <20> – 183000                                        | 285400 – <20> – 286400                                          |
| n94               | 100                              | 176000 – <20> – 183000                                        | 286400 – <20> – 303400                                          |
| n95               | 100                              | 402000 – <20> – 405000                                        | N/A                                                             |
| n96 <sup>3</sup>  | 15                               | 795000 – <1> – 875000                                         | 795000 – <1> – 875000                                           |
| n97               | 100                              | 460000 – <20> – 480000                                        | N/A                                                             |
| n98               | 100                              | 376000 – <20> – 384000                                        | N/A                                                             |

| NR operating band                                                                                                                                                              | $\Delta F_{\text{Raster}}$ (kHz) | Uplink Range of $N_{\text{REF}}$ (First – <Step size> – Last) | Downlink Range of $N_{\text{REF}}$ (First – <Step size> – Last) |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|---------------------------------------------------------------|-----------------------------------------------------------------|
| n99                                                                                                                                                                            | 100                              | 325300 – <20> – 332100                                        | N/A                                                             |
| n100                                                                                                                                                                           | 100                              | 174880 – <20> – 176000                                        | 183880 – <20> – 185000                                          |
| n101                                                                                                                                                                           | 100                              | 380000 – <20> – 382000                                        | 380000 – <20> – 382000                                          |
| n102 <sup>4</sup>                                                                                                                                                              | 15                               | 795000 – <1> – 828333                                         | 795000 – <1> – 828333                                           |
| n104                                                                                                                                                                           | 15                               | 828334 – <1> – 875000                                         | 828334 – <1> – 875000                                           |
|                                                                                                                                                                                | 30                               | 828334 – <2> – 875000                                         | 828334 – <2> – 875000                                           |
| NOTE 1: The channel numbers that designate carrier frequencies so close to the operating band edges that the carrier extends beyond the operating band edge shall not be used. |                                  |                                                               |                                                                 |
| NOTE 2: The following $N_{\text{REF}}$ are allowed for operation in Band n46: see Table 5.4.2.3-2.                                                                             |                                  |                                                               |                                                                 |
| NOTE 3: The following $N_{\text{REF}}$ are allowed for operation in Band n96: see Table 5.4.2.3-3.                                                                             |                                  |                                                               |                                                                 |
| NOTE 4: The following $N_{\text{REF}}$ are allowed for operation in Band n102: see Table 5.4.2.3-4.                                                                            |                                  |                                                               |                                                                 |

Table 5.4.2.3-2: Allowed  $N_{\text{REF}}$  (NR-ARFCN) for operation in Band n46

| Channel Bandwidth                                                                                                                                                                      | Allowed $N_{\text{REF}}$                                                                                                                                                                                                                                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 10 MHz                                                                                                                                                                                 | 782000, 788668                                                                                                                                                                                                                                                 |
| 20 MHz                                                                                                                                                                                 | 744000, 745332, 746668, 748000, 749332, 750668, 752000, 753332, 754668, 756000, 765332, 766668, 768000, 769332, 770668, 772000, 773332, 774668, 776000, 777332, 778668, 780000, 781332, 783000, 784332, 785668, 787000, 788332, 789668, 791000, 792332, 793668 |
| 40 MHz                                                                                                                                                                                 | 744668, 746000, 748668, 751332, 754000, 755332, 766000, 767332, 770000, 772668, 775332, 778000, 780668, 783668, 786332, 787668, 790332, 793000                                                                                                                 |
| 60 MHz                                                                                                                                                                                 | 745332, 746668, 748000, 752000, 753332, 754668, 766668, 768000, 769332, 773332, 774668, 778668, 780000, 784332, 785668, 791000, 792332                                                                                                                         |
| 80 MHz                                                                                                                                                                                 | 746000, 747332, 752668, 754000, 767332, 768668, 774000, 779332, 785000, 791668                                                                                                                                                                                 |
| 100 MHz                                                                                                                                                                                | 746668, 753332, 768000, 791000                                                                                                                                                                                                                                 |
| NOTE: 10 MHz channel bandwidth shall only apply in certain regions where the absence of non 3GPP technologies can be guaranteed on a long-term basis in this version of specification. |                                                                                                                                                                                                                                                                |

Table 5.4.2.3-3: Allowed  $N_{\text{REF}}$  (NR-ARFCN) for operation in Band n96

| Channel Bandwidth | Allowed $N_{\text{REF}}$                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 20 MHz            | 797000, 798332, 799668, 801000, 802332, 803668, 805000, 806332, 807668, 809000, 810332, 811668, 813000, 814332, 815668, 817000, 818332, 819668, 821000, 822332, 823668, 825000, 826332, 827668, 829000, 830332, 831668, 833000, 834332, 835668, 837000, 838332, 839668, 841000, 842332, 843668, 845000, 846332, 847668, 849000, 850332, 851668, 853000, 854332, 855668, 857000, 858332, 859668, 861000, 862332, 863668, 865000, 866332, 867668, 869000, 870332, 871668, 873000, 874332 |
| 40 MHz            | 797668, 800332, 803000, 805668, 808332, 811000, 813668, 816332, 819000, 821668, 824332, 827000, 829668, 832332, 835000, 837668, 840332, 843000, 845668, 848332, 851000, 853668, 856332, 859000, 861668, 864332, 867000, 869668, 872332                                                                                                                                                                                                                                                 |
| 60 MHz            | 798332, 799668, 803668, 805000, 809000, 810332, 814332, 815668, 819668, 821000, 825000, 826332, 830332, 831668, 835668, 837000, 841000, 842332, 846332, 847668, 851668, 853000, 857000, 858332, 862332, 863668, 867668, 869000, 873000                                                                                                                                                                                                                                                 |
| 80 MHz            | 799000, 804332, 809668, 815000, 820332, 825668, 831000, 836332, 841668, 847000, 852332, 857668, 863000, 868332                                                                                                                                                                                                                                                                                                                                                                         |
| 100 MHz           | 799668, 803668, 810332, 814332, 821000, 825000, 831668, 835668, 842332, 846332, 853000, 857000,                                                                                                                                                                                                                                                                                                                                                                                        |

|  |                                        |
|--|----------------------------------------|
|  | 863668, 867668, 869000, 870332, 871668 |
|--|----------------------------------------|

**Table 5.4.2.3-4: Allowed  $N_{\text{REF}}$  (NR-ARFCN) for operation in Band n102**

| Channel Bandwidth | Allowed $N_{\text{REF}}$                                                                                                                                                                       |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 20 MHz            | 797000, 798332, 799668, 801000, 802332, 803668, 805000, 806332, 807668, 809000, 810332, 811668, 813000, 814332, 815668, 817000, 818332, 819668, 821000, 822332, 823668, 825000, 826332, 827668 |
| 40 MHz            | 797668, 800332, 803000, 805668, 808332, 811000, 813668, 816332, 819000, 821668, 824332, 827000                                                                                                 |
| 60 MHz            | 798332, 799668, 803668, 805000, 809000, 810332, 814332, 815668, 819668, 821000, 825000, 826332                                                                                                 |
| 80 MHz            | 799000, 804332, 809668, 815000, 820332, 825668                                                                                                                                                 |
| 100 MHz           | 799668, 803668, 810332, 814332, 821000, 825000                                                                                                                                                 |

## 5.4.3 Synchronization raster

### 5.4.3.1 Synchronization raster and numbering

The synchronization raster indicates the frequency positions of the synchronization block that can be used by the UE for system acquisition when explicit signalling of the synchronization block position is not present.

A global synchronization raster is defined for all frequencies. The frequency position of the SS block is defined as  $SS_{\text{REF}}$  with corresponding number GSCN. The parameters defining the  $SS_{\text{REF}}$  and GSCN for all the frequency ranges are in Table 5.4.3.1-1.

The resource element corresponding to the SS block reference frequency  $SS_{\text{REF}}$  is given in clause 5.4.3.2. The synchronization raster and the subcarrier spacing of the synchronization block is defined separately for each band.

**Table 5.4.3.1-1: GSCN parameters for the global frequency raster**

| Frequency range                                                                                               | SS Block frequency position $SS_{\text{REF}}$                                         | GSCN           | Range of GSCN |
|---------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------|---------------|
| 0 – 3000 MHz                                                                                                  | $N * 1200\text{kHz} + M * 50\text{ kHz}$ ,<br>$N=1:2499$ , $M \in \{1,3,5\}$ (Note 1) | $3N + (M-3)/2$ | 2 – 7498      |
| 3000 – 24250 MHz                                                                                              | $3000\text{ MHz} + N * 1.44\text{ MHz}$<br>$N = 0:14756$                              | $7499 + N$     | 7499 – 22255  |
| NOTE 1: The default value for operating bands with which only support SCS spaced channel raster(s) is $M=3$ . |                                                                                       |                |               |

### 5.4.3.2 Synchronization raster to synchronization block resource element mapping

The mapping between the synchronization raster and the corresponding resource element of the SS block is given in Table 5.4.3.2-1.

**Table 5.4.3.2-1: Synchronization raster to SS block resource element mapping**

|                            |     |
|----------------------------|-----|
| Resource element index $k$ | 120 |
|----------------------------|-----|

$k$  is the subcarrier number of SS/PBCH block defined in TS 38.211 clause 7.4.3.1 [6].

### 5.4.3.3 Synchronization raster entries for each operating band

The synchronization raster for each band is give in Table 5.4.3.3-1. The distance between applicable GSCN entries is given by the <Step size> indicated in Table 5.4.3.3-1.

Table 5.4.3.3-1: Applicable SS raster entries per operating band

| NR operating band | SS Block SCS | SS Block pattern <sup>1</sup> | Range of GSCN<br>(First – <Step size> – Last) |
|-------------------|--------------|-------------------------------|-----------------------------------------------|
| n1                | 15 kHz       | Case A                        | 5279 – <1> – 5419                             |
| n2                | 15 kHz       | Case A                        | 4829 – <1> – 4969                             |
| n3                | 15 kHz       | Case A                        | 4517 – <1> – 4693                             |
| n5                | 15 kHz       | Case A                        | 2177 – <1> – 2230                             |
|                   | 30 kHz       | Case B                        | 2183 – <1> – 2224                             |
| n7                | 15 kHz       | Case A                        | 6554 – <1> – 6718                             |
| n8                | 15 kHz       | Case A                        | 2318 – <1> – 2395                             |
| n12               | 15 kHz       | Case A                        | 1828 – <1> – 1858                             |
| n13               | 15 kHz       | Case A                        | 1871 – <1> – 1885                             |
| n14               | 15 kHz       | Case A                        | 1901 – <1> – 1915                             |
| n18               | 15 kHz       | Case A                        | 2156 – <1> – 2182                             |
| n20               | 15 kHz       | Case A                        | 1982 – <1> – 2047                             |
| n24               | 15 kHz       | Case A                        | 3818 – <1> – 3892                             |
|                   | 30 kHz       | Case B                        | 3824 – <1> – 3886                             |
| n25               | 15 kHz       | Case A                        | 4829 – <1> – 4981                             |
| n26               | 15 kHz       | Case A                        | 2153 – <1> – 2230                             |
| n28               | 15 kHz       | Case A                        | 1901 – <1> – 2002                             |
| n29               | 15 kHz       | Case A                        | 1798 – <1> – 1813                             |
| n30               | 15 kHz       | Case A                        | 5879 – <1> – 5893                             |
| n34               | 15 kHz       | Case A                        | NOTE 5                                        |
|                   | 30 kHz       | Case C                        | 5036 – <1> – 5050                             |
| n38               | 15 kHz       | Case A                        | NOTE 2                                        |
|                   | 30 kHz       | Case C                        | 6437 – <1> – 6538                             |
| n39               | 15 kHz       | Case A                        | NOTE 6                                        |
|                   | 30 kHz       | Case C                        | 4712 – <1> – 4789                             |
| n40               | 30 kHz       | Case C                        | 5762 – <1> – 5989                             |
| n41               | 15 kHz       | Case A                        | 6246 – <3> – 6717                             |
|                   | 30 kHz       | Case C                        | 6252 – <3> – 6714                             |
| n46 <sup>3</sup>  | 30 kHz       | Case C                        | 8993 – <1> – 9530                             |
| n48               | 30 kHz       | Case C                        | 7884 – <1> – 7982                             |
| n50               | 30 kHz       | Case C                        | 3590 – <1> – 3781                             |
| n51               | 15 kHz       | Case A                        | 3572 – <1> – 3574                             |
| n53               | 15 kHz       | Case A                        | 6215 – <1> – 6232                             |
|                   | 30 kHz       | Case C                        | 6221 – <1> – 6226                             |
| n65               | 15 kHz       | Case A                        | 5279 – <1> – 5494                             |
| n66               | 15 kHz       | Case A                        | 5279 – <1> – 5494                             |
|                   | 30 kHz       | Case B                        | 5285 – <1> – 5488                             |
| n67               | 15 kHz       | Case A                        | 1850 – <1> – 1888                             |
| n70               | 15 kHz       | Case A                        | 4993 – <1> – 5044                             |
| n71               | 15 kHz       | Case A                        | 1547 – <1> – 1624                             |
| n74               | 15 kHz       | Case A                        | 3692 – <1> – 3790                             |
| n75               | 15 kHz       | Case A                        | 3584 – <1> – 3787                             |
| n76               | 15 kHz       | Case A                        | 3572 – <1> – 3574                             |
| n77               | 30 kHz       | Case C                        | 7711 – <1> – 8329                             |
| n78               | 30 kHz       | Case C                        | 7711 – <1> – 8051                             |
| n79               | 30 kHz       | Case C                        | 8480 – <16> – 8880 <sup>7</sup>               |
|                   |              |                               | 8475 – <1> – 8884 <sup>8</sup>                |
| n85               | 15 kHz       | Case A                        | 1826 – <1> – 1858                             |
| n90               | 15 kHz       | Case A                        | 6246 – <1> – 6717 <sup>10</sup>               |
|                   |              |                               | 6245 – <1> – 6718 <sup>11</sup>               |
|                   |              |                               | 6252 – <1> – 6714                             |
| n91               | 15 kHz       | Case A                        | 3572 – <1> – 3574                             |
|                   |              |                               | 3584 – <1> – 3787                             |
| n92               | 15 kHz       | Case A                        | 3584 – <1> – 3787                             |
| n93               | 15 kHz       | Case A                        | 3572 – <1> – 3574                             |
| n94               | 15 kHz       | Case A                        | 3584 – <1> – 3787                             |
| n96 <sup>4</sup>  | 30 kHz       | Case C                        | 9531 – <1> – 10363                            |
| n100              | 15 kHz       | Case A                        | 2303 – <1> – 2307                             |
| n101              | 15 kHz       | Case A                        | 4754 – <1> – 4768                             |
|                   | 30 kHz       | Case C                        | 4760 – <1> – 4764                             |
| n102 <sup>9</sup> | 30 kHz       | Case C                        | 9531 – <1> – 9877                             |
| n104              | 30 kHz       | Case C                        | 9882 – <7> – 10358                            |

| NR operating band                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | SS Block SCS | SS Block pattern <sup>1</sup> | Range of GSCN<br>(First – <Step size> – Last) |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-------------------------------|-----------------------------------------------|
| <p>NOTE 1: SS Block pattern is defined in clause 4.1 in TS 38.213 [8].</p> <p>NOTE 2: The applicable SS raster entries are GSCN = {6432, 6443, 6457, 6468, 6479, 6493, 6507, 6518, 6532, 6543}.</p> <p>NOTE 3: The following GSCN are allowed for operation in band n46:<br/>GSCN = {8996, 9010, 9024, 9038, 9051, 9065, 9079, 9093, 9107, 9121, 9218, 9232, 9246, 9260, 9274, 9288, 9301, 9315, 9329, 9343, 9357, 9371, 9385, 9402, 9416, 9430, 9444, 9458, 9472, 9485, 9499, 9513}.</p> <p>NOTE 4: The following GSCN are allowed for operation in band n96:<br/>GSCN = {9548, 9562, 9576, 9590, 9603, 9617, 9631, 9645, 9659, 9673, 9687, 9701, 9714, 9728, 9742, 9756, 9770, 9784, 9798, 9812, 9826, 9840, 9853, 9867, 9881, 9895, 9909, 9923, 9937, 9951, 9964, 9978, 9992, 10006, 10020, 10034, 10048, 10062, 10076, 10090, 10103, 10117, 10131, 10145, 10159, 10173, 10187, 10201, 10214, 10228, 10242, 10256, 10270, 10284, 10298, 10312, 10325, 10339, 10353}.</p> <p>NOTE 5: The applicable SS raster entries are GSCN = {5032, 5043, 5054}</p> <p>NOTE 6: The applicable SS raster entries are GSCN = {4707, 4715, 4718, 4729, 4732, 4743, 4747, 4754, 4761, 4768, 4772, 4782, 4786, 4793}</p> <p>NOTE 7: The SS raster entries apply for channel bandwidths larger than or equal to 40 MHz</p> <p>NOTE 8: The SS raster entries apply for channel bandwidths smaller than 40 MHz</p> <p>NOTE 9: The following GSCN are allowed for operation in band n102:<br/>GSCN = {9548, 9562, 9576, 9590, 9603, 9617, 9631, 9645, 9659, 9673, 9687, 9701, 9714, 9728, 9742, 9756, 9770, 9784, 9798, 9812, 9826, 9840, 9853, 9867}.</p> <p>NOTE 10: The SS raster entries apply for channel bandwidths larger than or equal to 10 MHz.</p> <p>NOTE 11: The SS raster entries apply for channel bandwidth equal to 5 MHz</p> |              |                               |                                               |

#### 5.4.4 TX–RX frequency separation

The default TX channel (carrier centre frequency) to RX channel (carrier centre frequency) separation for operating bands is specified in Table 5.4.4-1.

**Table 5.4.4-1: UE TX-RX frequency separation**

| NR Operating Band | TX – RX<br>carrier centre frequency<br>separation                              |
|-------------------|--------------------------------------------------------------------------------|
| n1                | 190 MHz                                                                        |
| n2                | 80 MHz                                                                         |
| n3                | 95 MHz                                                                         |
| n5                | 45 MHz                                                                         |
| n7                | 120 MHz                                                                        |
| n8                | 45 MHz                                                                         |
| n12               | 30 MHz                                                                         |
| n13               | -31 MHz                                                                        |
| n14               | -30 MHz                                                                        |
| n18               | 45 MHz                                                                         |
| n20               | -41 MHz                                                                        |
| n24               | -101.5, -120.5 MHz                                                             |
| n25               | 80 MHz                                                                         |
| n26               | 45 MHz                                                                         |
| n28               | 55 MHz                                                                         |
| n30               | 45 MHz                                                                         |
| n65               | 190 MHz                                                                        |
| n66               | 400 MHz                                                                        |
| n70               | 300 MHz                                                                        |
| n71               | -46 MHz                                                                        |
| n74               | 48 MHz                                                                         |
| n85               | 30 MHz                                                                         |
| n91               | 570 MHz – 595 MHz<br>(NOTE 2)                                                  |
| n92               | 575 MHz – 680 MHz ( $\mu = 0$ )<br>580 MHz – 675 MHz ( $\mu = 1$ )<br>(NOTE 2) |
| n93               | 517 MHz – 547 MHz<br>(NOTE 2)                                                  |
| n94               | 522 MHz – 632 MHz ( $\mu = 0$ )                                                |



| NR Operating Band                                                                                                                                                                                                                                                                                                                                                                                                                                  | TX – RX<br>carrier centre frequency<br>separation |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 527 MHz – 627 MHz ( $\mu = 1$ )<br>(NOTE 2)       |
| n100                                                                                                                                                                                                                                                                                                                                                                                                                                               | 45 MHz                                            |
| NOTE 1: Void<br>NOTE 2: The range of TX-RX frequency separation given paired UL and DL channel bandwidths $BW_{UL}$ and $BW_{DL}$ is given by the respective lower and upper limit $F_{DL\_low} - F_{UL\_high} + 0.5(BW_{DL} + BW_{UL})$ and $F_{DL\_high} - F_{UL\_low} - 0.5(BW_{DL} + BW_{UL})$ . The UL and DL channel bandwidth combinations specified in Table 5.3.5-1 and 5.3.6-1 depend on the subcarrier spacing configuration $\mu$ [6]. |                                                   |

## 5.4A Channel arrangement for CA

### 5.4A.1 Channel spacing for CA

For intra-band contiguous carrier aggregation with two or more component carriers, the nominal channel spacing between two adjacent NR component carriers is defined as the following unless stated otherwise:

For NR operating bands with a 100 kHz channel raster:

$$\text{Nominal channel spacing} = \left\lfloor \frac{BW_{Channel(1)} + BW_{Channel(2)} - 2|GB_{Channel(1)} - GB_{Channel(2)}|}{0.6} \right\rfloor 0.3 [\text{MHz}]$$

while for NR operating bands without a 100 kHz channel raster:

$$\text{Nominal channel spacing} = \left\lfloor \frac{BW_{Channel(1)} + BW_{Channel(2)} - 2|GB_{Channel(1)} - GB_{Channel(2)}|}{0.015 * 2^{n+1}} \right\rfloor 0.015 * 2^n [\text{MHz}]$$

with

$$n = \mu_0$$

where  $BW_{Channel(1)}$  and  $BW_{Channel(2)}$  are the channel bandwidths of the two respective NR component carriers according to Table 5.3.2-1 with values in MHz,  $\mu_0$  is the largest  $\mu$  value among the subcarrier spacing configurations supported in the operating band for both of the channel bandwidths according to Table 5.3.5-1 and  $GB_{Channel(i)}$  is the minimum guard band for channel bandwidth  $i$  according to Table 5.3.3-1 for the said  $\mu$  value with  $\mu$  as defined in TS 38.211. In case there is no common  $\mu$  value for both of the channel bandwidths,  $\mu_0=1$  is selected and  $GB_{Channel(i)}$  is the minimum guard band for channel bandwidth  $i$  according to Table 5.3.3-1 for  $\mu=1$  with  $\mu$  as defined in TS 38.211.

The channel spacing for intra-band contiguous carrier aggregation can be adjusted to any multiple of least common multiple of channel raster and sub-carrier spacing less than the nominal channel spacing to optimize performance in a particular deployment scenario.

For intra-band contiguous carrier aggregation in NR bands restricted to operation with shared-spectrum channel access, the maximum deviation from the nominal channel spacing is 300 kHz.

For intra-band non-contiguous carrier aggregation, the channel spacing between two NR component carriers in different sub-blocks shall be larger than the nominal channel spacing defined in this clause.

### 5.4A.2 Channel raster for CA

For inter-band and intra-band contiguous carrier aggregation, the channel raster requirements in clause 5.4.2 apply for each operating band.

### 5.4A.3 Synchronization raster for CA

For inter-band and intra-band contiguous carrier aggregation, the synchronization raster requirements in clause 5.4.3 apply for each operating band.

### 5.4A.4 Tx-Rx frequency separation for CA

For inter-band carrier aggregation, the Tx-Rx frequency separation requirements in clause 5.4.4 apply for each operating band.

For intra-band contiguous carrier aggregation, the same TX-RX frequency separation as specified in Table 5.4.4-1 is applied to PCC and SCC, respectively.

## 5.4B Reserved

## 5.4C Reserved

## 5.4D Reserved

## 5.4E Channel arrangement for V2X

### 5.4E.1 Channel spacing

For NR V2X, the channel spacing requirements in clause 5.4.1 apply for each operating band.

### 5.4E.2 Channel raster

#### 5.4E.2.1 NR-ARFCN and channel raster

For NR V2X, the NR-ARFCN and channel raster requirements in clause 5.4.2.1 apply for each operating band.

For NR V2X UE, the reference frequency can be shifted by configuration.

$$F_{\text{REF\_V2X}} = F_{\text{REF}} + \Delta_{\text{shift}} + N * 5 \text{ kHz}$$

where

$\Delta_{\text{shift}} = 0 \text{ kHz}$  or  $7.5 \text{ kHz}$  indicated in IE (*frequencyShift7p5khz*), and

N can be set as one of following values  $\{-1, 0, 1\}$ , which are signalled by the network in higher layer parameters or configured by pre-configuration parameters.

#### 5.4E.2.2 Channel raster to resource element mapping

For NR V2X, the channel raster to resource element mapping requirements in clause 5.4.2.2 apply for each operating band.

#### 5.4E.2.3 Channel raster entries for each operating band

For NR V2X, the channel raster entries requirements in clause 5.4.2.3 apply for each operating band.

The RF channel positions on the channel raster in each NR V2X operating band are given through the applicable NR-ARFCN in Table 5.4.2.3-1, using the channel raster to resource element mapping in clause 5.4.2.2.

For NR V2X operating band n47,  $\Delta F_{\text{Raster}} = I \times \Delta F_{\text{Global}}$ , where  $I \in \{1\}$ . Every  $I^{\text{th}}$  NR-ARFCN within the operating band are applicable for the channel raster within the operating band and the step size for the channel raster in Table 5.4.2.3-1 is given as  $\langle I \rangle$ .

### 5.4E.3 Synchronization raster for V2X

There is no synchronization raster definition for NR V2X for both licensed bands and unlicensed bands.

## 5.4I Channel arrangement for RedCap

### 5.4I.1 Channel spacing for RedCap

For RedCap UEs, the channel spacing requirements in clause 5.4.1 apply for each operating band.

### 5.4I.2 Channel raster for RedCap

#### 5.4I.2.1 NR-ARFCN and channel raster

For RedCap UEs, the NR-ARFCN and channel raster requirements in clause 5.4.2.1 apply for each operating band.

#### 5.4I.2.2 Channel raster to resource element mapping

For RedCap UEs, the channel raster to resource element mapping requirements in clause 5.4.2.2 apply for each operating band.

#### 5.4I.2.3 Channel raster entries for each operating band

For RedCap UEs, the RF channel positions on the channel raster in each NR operating band are given through the applicable NR-ARFCN in Table 5.4.2.3-1 and additional intermediary NR-ARFCN with a step size of  $\langle 2 \rangle$  for operating bands that are included in Table 5.4.2.3-1 with a step size of  $\langle 20 \rangle$ , using the channel raster to resource element mapping in clause 5.4I.2.2.

For NR operating bands included in Table 5.4.2.3-1 with a step size of  $\langle 20 \rangle$ , the channel raster for RedCap UEs is defined with  $\Delta F_{\text{Raster}} = 2 \times \Delta F_{\text{Global}}$ . In this case every 2<sup>nd</sup> NR-ARFCN within the operating band are applicable for the channel raster within the operating band and the step size for the channel raster is given as  $\langle 2 \rangle$ , every 10<sup>th</sup> of these channel raster entries coincides with entries defined in Table 5.4.2.3-1 for this operating band.

NOTE: The RedCap UE, which complies with Rel-17 specifications of version 17.14.0 and before version 17.14.0, may support the legacy channel raster only.

### 5.4I.3 Synchronization raster for RedCap

For RedCap UEs, the synchronization raster requirements in clause 5.4.3 apply for each operating band. The synchronization raster and the corresponding SS block do not cover all possible RF channel bandwidths and locations on the channel raster defined in sub-clause 5.4I.2.

### 5.4I.4 Tx-Rx frequency separation for RedCap

For RedCap UEs, the Tx-Rx frequency separation requirements in clause 5.4.4 apply for each operating band.

## 5.5 Void

### 5.5A Configurations for CA

#### 5.5A.0 General

The configurations for CA operating band including Band n41 also apply for the corresponding CA operating bands with Band n90 replacing Band n41 but with otherwise identical parameters. For brevity the said configuration for CA operating bands with Band n90 are not listed in the tables below but are covered by this specification.

Non-contiguous resource allocation and almost contiguous allocation are not applicable for each NR carrier of intra-band contiguous and non-contiguous CA configurations.

For a CA configuration with one or more operating band supporting asymmetric channel bandwidths as specified in sub-clause 5.3.6, requirements are defined for an asymmetric UL and DL channel bandwidth combination of a supported asymmetric channel bandwidth combination set for an operating band of the CA configuration when the said UL and DL channel bandwidths are also contained in a supported bandwidth combination set of the CA configuration.

For a higher order band combination of which CA\_n20-n28 is a subset, the frequency range in band n28 is restricted for the higher order band combination to 703-733 MHz for the UL and 758-788 MHz for the DL.

The configuration tables for CA describe Bandwidth Combination Sets. Bandwidth Combination Set 4 and 5 contain all possible defined channel bandwidths for each band in the combination. The fact that BCS4 and BCS5 contain all channel bandwidths for each band does not alter if a bandwidth is mandatory or optional for a given band. Bandwidths that are identified as optional in Table 5.3.5-1 for a given release are still optional for UEs that support BCS4 or BCS5, where the bandwidths the UE supports for each band, the maximum bandwidth and/or minimum bandwidth for the band in the band combination are indicated in the UE capabilities. The minimum bandwidth per CC and maximum aggregated FDD, TDD and total bandwidth per band combination may be indicated only for BCS5 as described in 38.306 [15] and BCS5 shall not be indicated together with BCS4 for a CA configuration. For inter-band CA combinations including FR1 intra-band CA and with BCS4 or BCS5 in the following configuration tables, the Bandwidth Combination Sets for the FR1 intra-band CA are BCS4 or BCS5, respectively.

By default, power class 3 is applicable for the CA configurations listed in the following clauses. The applicability of higher power class(es) is described in the CA configuration tables in clauses 5.5A.1, 5.5A.2 and 5.5A.3. For inter-band CA combinations in clause 5.5A.3, the applicability of higher power class(es) for higher order band combinations is extended based on the following conditions:

- For a combination of intra-band and inter-band CA, the same higher power class(es) may be supported, which are specified for the inter-band UL CA configuration(s) in the combination composed of the same bands without intra-band CA.
- For a combination of intra-band and inter-band CA, the higher power class(es) may be supported for single-carrier UL when the same higher power class(es) are specified for all its fallback combinations.
- For a combination with 3 or more DL bands without intra-band CA, the higher power class(es) may be supported for single-carrier UL when the same higher power class(es) are specified for all its 2-band fallback combinations.
- For a combination with 4 or more DL bands without intra-band CA, the higher power class(es) may be supported for inter-band UL CA configuration(s) when the same higher power class(es) are specified for all its 3-band fallback combinations.

A UE supporting a given power class for a CA configuration shall meet the corresponding transmitter and receiver requirements in Clause 6 and Clause 7, respectively.

#### 5.5A.1 Configurations for intra-band contiguous CA

**Table 5.5A.1-1: NR CA configurations and bandwidth combination sets defined for intra-band contiguous CA**

| NR CA configuration / Bandwidth combination set |                                                                |                                                                           |                                      |                                      |                                      |                                      |                                    |                           |
|-------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|------------------------------------|---------------------------|
| NR CA configuration                             | Uplink CA configurations or single uplink carrier <sup>5</sup> | Channel bandwidths for carrier (MHz)                                      | Channel bandwidths for carrier (MHz) | Channel bandwidths for carrier (MHz) | Channel bandwidths for carrier (MHz) | Channel bandwidths for carrier (MHz) | Maximum aggregated bandwidth (MHz) | Bandwidth combination set |
| CA_n1B                                          | -                                                              | 10                                                                        | 10,15                                |                                      |                                      |                                      | 40                                 | 0                         |
|                                                 |                                                                | 15                                                                        | 15,20                                |                                      |                                      |                                      |                                    |                           |
|                                                 |                                                                | 20                                                                        | 20                                   |                                      |                                      |                                      |                                    |                           |
| CA_n2B                                          | -                                                              | 5                                                                         | 15                                   |                                      |                                      |                                      | 20                                 | 0                         |
|                                                 |                                                                | 10                                                                        | 10                                   |                                      |                                      |                                      |                                    |                           |
| CA_n3B                                          | -                                                              | 5                                                                         | 15, 20, 25, 30                       |                                      |                                      |                                      | 60                                 | 0                         |
|                                                 |                                                                | 10                                                                        | 10, 15, 20, 25, 30                   |                                      |                                      |                                      |                                    |                           |
|                                                 |                                                                | 15, 20, 25, 30                                                            | 5, 10, 15, 20, 25, 30                |                                      |                                      |                                      |                                    |                           |
| CA_n5B                                          | CA_n5B                                                         | 5, 10, 15                                                                 | 5, 10, 15                            |                                      |                                      |                                      | 20                                 | 0                         |
| CA_n7B                                          | CA_n7B                                                         | 10                                                                        | 10, 15, 20, 30, 40                   |                                      |                                      |                                      | 50                                 | 0                         |
|                                                 |                                                                | 15                                                                        | 15, 20, 30                           |                                      |                                      |                                      |                                    |                           |
|                                                 |                                                                | 20                                                                        | 20, 30                               |                                      |                                      |                                      |                                    |                           |
| CA_n25B                                         | -                                                              | 5                                                                         | 15                                   |                                      |                                      |                                      | 20                                 | 0                         |
|                                                 |                                                                | 10                                                                        | 10                                   |                                      |                                      |                                      |                                    |                           |
| CA_n38B                                         | -                                                              | 5                                                                         | 15, 20, 25                           |                                      |                                      |                                      | 50                                 | 0                         |
|                                                 |                                                                | 10                                                                        | 10, 15, 20, 25                       |                                      |                                      |                                      |                                    |                           |
|                                                 |                                                                | 15, 20, 25                                                                | 5, 10, 15, 20, 25                    |                                      |                                      |                                      |                                    |                           |
| CA_n40B                                         | -                                                              | 20                                                                        | 80                                   |                                      |                                      |                                      | 100                                | 0                         |
|                                                 |                                                                | 50                                                                        | 50                                   |                                      |                                      |                                      |                                    |                           |
|                                                 | CA_n40B                                                        | 10,15, 20, 30, 40, 50, 60, 80                                             | 10, 15, 20, 30, 40, 50, 60, 80       |                                      |                                      |                                      | 100                                | 1                         |
| CA_n41B                                         | n41 <sup>3</sup><br>CA_n41B                                    | 10, 20, 30, 40, 50                                                        | 10, 20, 30, 40, 50                   |                                      |                                      |                                      | 100                                | 0                         |
| CA_n41C                                         | n41 <sup>3,4</sup><br>CA_n41C <sup>3</sup>                     | 40                                                                        | 80, 100                              |                                      |                                      |                                      | 180                                | 0                         |
|                                                 |                                                                | 50, 60, 80                                                                | 60, 80, 100                          |                                      |                                      |                                      |                                    |                           |
|                                                 |                                                                | 10                                                                        | 100                                  |                                      |                                      |                                      | 190                                | 1                         |
|                                                 |                                                                | 15, 20                                                                    | 90, 100                              |                                      |                                      |                                      |                                    |                           |
|                                                 |                                                                | 40                                                                        | 80, 90, 100                          |                                      |                                      |                                      |                                    |                           |
|                                                 |                                                                | 50, 60, 80, 90                                                            | 60, 80, 90, 100                      |                                      |                                      |                                      |                                    |                           |
|                                                 |                                                                | 10                                                                        | 100                                  |                                      |                                      |                                      | 190                                | 2                         |
|                                                 |                                                                | 15, 20                                                                    | 90, 100                              |                                      |                                      |                                      |                                    |                           |
|                                                 |                                                                | 30, 40                                                                    | 80, 90, 100                          |                                      |                                      |                                      |                                    |                           |
|                                                 |                                                                | 50, 60, 80, 90                                                            | 60, 80, 90, 100                      |                                      |                                      |                                      |                                    |                           |
|                                                 |                                                                | See n41 channel bandwidths in Table 5.3.5-1 for each carrier <sup>2</sup> |                                      |                                      |                                      |                                      | 190                                | 4 and 5                   |
| CA_n46B                                         | -                                                              | 20, 40, 60                                                                | 20, 40                               |                                      |                                      |                                      | 100                                | 0                         |
| CA_n46C                                         | -                                                              | 60, 80                                                                    | 60, 80                               |                                      |                                      |                                      | 160                                | 0                         |
| CA_n46D                                         | -                                                              | 60, 80                                                                    | 80                                   | 80                                   |                                      |                                      | 240                                | 0                         |
| CA_n46M                                         | -                                                              | 20, 40, 60                                                                | 20, 40                               | 20, 40                               |                                      |                                      | 140                                | 0                         |
| CA_n46N                                         |                                                                | Void                                                                      |                                      |                                      |                                      |                                      |                                    | 0                         |
|                                                 | -                                                              | 20, 40, 60                                                                | 20, 40                               | 20, 40                               | 20, 40                               |                                      | 180                                | 1                         |
| CA_n46O                                         | -                                                              | 20, 60                                                                    | 20, 40                               | 20, 40                               | 20, 40                               | 20, 40                               | 220                                | 0                         |
| CA_n48B                                         | CA_n48B                                                        | 5                                                                         | 15, 20                               |                                      |                                      |                                      | 40                                 | 0                         |
|                                                 |                                                                | 10, 15, 20                                                                | 10, 15, 20                           |                                      |                                      |                                      |                                    |                           |

| NR CA configuration / Bandwidth combination set |                                                                |                                                                           |                                        |                                      |                                      |                                      |                                    |                           |
|-------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------------------------------|----------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|------------------------------------|---------------------------|
| NR CA configuration                             | Uplink CA configurations or single uplink carrier <sup>5</sup> | Channel bandwidths for carrier (MHz)                                      | Channel bandwidths for carrier (MHz)   | Channel bandwidths for carrier (MHz) | Channel bandwidths for carrier (MHz) | Channel bandwidths for carrier (MHz) | Maximum aggregated bandwidth (MHz) | Bandwidth combination set |
|                                                 | -                                                              | 15, 20                                                                    | 15, 20                                 |                                      |                                      |                                      | 100                                | 1                         |
|                                                 |                                                                | 10                                                                        | 50, 60, 80, 90                         |                                      |                                      |                                      |                                    |                           |
|                                                 |                                                                | 15, 20                                                                    | 40, 50, 60, 80                         |                                      |                                      |                                      |                                    |                           |
|                                                 |                                                                | 40                                                                        | 40, 50, 60                             |                                      |                                      |                                      |                                    |                           |
|                                                 | -                                                              | 10, 15, 20, 30, 40                                                        | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90 |                                      |                                      |                                      | 100                                | 2                         |
| CA_n48C                                         | -                                                              | 10                                                                        | 100                                    |                                      |                                      |                                      | 140                                | 0                         |
|                                                 |                                                                | 15                                                                        | 90, 100                                |                                      |                                      |                                      |                                    |                           |
|                                                 |                                                                | 20                                                                        | 90, 100                                |                                      |                                      |                                      |                                    |                           |
|                                                 |                                                                | 40                                                                        | 80, 90, 100                            |                                      |                                      |                                      |                                    |                           |
|                                                 | -                                                              | 10, 15, 20, 30, 40                                                        | 70, 80, 90, 100                        |                                      |                                      |                                      | 140                                | 1                         |
| CA_n66B                                         | -                                                              | 5                                                                         | 20, 40                                 |                                      |                                      |                                      | 50                                 | 0                         |
|                                                 |                                                                | 10                                                                        | 15, 20, 40                             |                                      |                                      |                                      |                                    |                           |
|                                                 |                                                                | 15                                                                        | 15, 20                                 |                                      |                                      |                                      |                                    |                           |
| CA_n71B                                         | -                                                              | 5                                                                         | 20                                     |                                      |                                      |                                      | 25                                 | 0                         |
|                                                 |                                                                | 10                                                                        | 15                                     |                                      |                                      |                                      | 35                                 | 1                         |
|                                                 |                                                                | 10                                                                        | 20                                     |                                      |                                      |                                      |                                    |                           |
|                                                 |                                                                | 15                                                                        | 15, 20                                 |                                      |                                      |                                      |                                    |                           |
|                                                 |                                                                | 5, 10, 15                                                                 | 15, 20                                 |                                      |                                      |                                      | 35                                 | 2                         |
|                                                 |                                                                | See n71 channel bandwidths in Table 5.3.5-1 for each carrier <sup>2</sup> |                                        |                                      |                                      |                                      | 35                                 | 4 and 5                   |
| CA_n77B                                         | n77 <sup>3</sup>                                               | 20                                                                        | 25, 30, 40                             |                                      |                                      |                                      | 60                                 | 0                         |
|                                                 |                                                                | 25                                                                        | 30                                     |                                      |                                      |                                      |                                    |                           |
| CA_n77C                                         | n77 <sup>3</sup><br>CA_n77C                                    | 50                                                                        | 60, 80, 100                            |                                      |                                      |                                      | 200                                | 0                         |
|                                                 |                                                                | 60                                                                        | 60, 80, 100                            |                                      |                                      |                                      |                                    |                           |
|                                                 |                                                                | 80                                                                        | 80, 100                                |                                      |                                      |                                      |                                    |                           |
|                                                 |                                                                | 100                                                                       | 100                                    |                                      |                                      |                                      |                                    |                           |
|                                                 |                                                                | 10                                                                        | 100                                    |                                      |                                      |                                      |                                    |                           |
|                                                 |                                                                | 15, 20                                                                    | 90, 100                                |                                      |                                      |                                      | 200                                | 1                         |
|                                                 |                                                                | 25, 30                                                                    | 80, 90, 100                            |                                      |                                      |                                      |                                    |                           |
|                                                 |                                                                | 40                                                                        | 70, 80, 90, 100                        |                                      |                                      |                                      |                                    |                           |
|                                                 |                                                                | 50, 60, 70, 80, 90, 100                                                   | 60, 70, 80, 90, 100                    |                                      |                                      |                                      |                                    |                           |
|                                                 |                                                                |                                                                           |                                        |                                      |                                      |                                      |                                    |                           |
| CA_n77D                                         | n77 <sup>3</sup>                                               | 100                                                                       | 100                                    | 100                                  |                                      |                                      | 300                                | 0                         |
| CA_n78B                                         | n78 <sup>3</sup>                                               | 20                                                                        | 50                                     |                                      |                                      |                                      | 70                                 | 0                         |
| CA_n78C                                         | n78 <sup>3</sup><br>CA_n78C <sup>3</sup>                       | 50                                                                        | 60, 80, 100                            |                                      |                                      |                                      | 200                                | 0                         |
|                                                 |                                                                | 60                                                                        | 60, 80, 100                            |                                      |                                      |                                      |                                    |                           |
|                                                 |                                                                | 80                                                                        | 80, 100                                |                                      |                                      |                                      |                                    |                           |
|                                                 |                                                                | 100                                                                       | 100                                    |                                      |                                      |                                      |                                    |                           |
|                                                 |                                                                | 10                                                                        | 100                                    |                                      |                                      |                                      | 200                                | 1                         |
|                                                 |                                                                | 15, 20                                                                    | 90, 100                                |                                      |                                      |                                      |                                    |                           |
|                                                 |                                                                | 25, 30                                                                    | 80, 90, 100                            |                                      |                                      |                                      |                                    |                           |
|                                                 |                                                                | 40                                                                        | 70, 80, 90, 100                        |                                      |                                      |                                      |                                    |                           |

| NR CA configuration / Bandwidth combination set                                                                                                                                                 |                                                                |                                      |                                      |                                      |                                      |                                      |                                    |                           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|------------------------------------|---------------------------|
| NR CA configuration n                                                                                                                                                                           | Uplink CA configurations or single uplink carrier <sup>5</sup> | Channel bandwidths for carrier (MHz) | Channel bandwidths for carrier (MHz) | Channel bandwidths for carrier (MHz) | Channel bandwidths for carrier (MHz) | Channel bandwidths for carrier (MHz) | Maximum aggregated bandwidth (MHz) | Bandwidth combination set |
|                                                                                                                                                                                                 |                                                                | 50, 60, 70, 80, 90, 100              | 60, 70, 80, 90, 100                  |                                      |                                      |                                      |                                    |                           |
| CA_n78D                                                                                                                                                                                         | n78 <sup>3</sup>                                               | 100                                  | 100                                  | 100                                  |                                      |                                      | 300                                | 0                         |
| CA_n79C                                                                                                                                                                                         | CA_n79C                                                        | 50                                   | 60, 80, 100                          |                                      |                                      |                                      | 200                                | 0                         |
|                                                                                                                                                                                                 |                                                                | 60                                   | 60, 80, 100                          |                                      |                                      |                                      |                                    |                           |
|                                                                                                                                                                                                 |                                                                | 80                                   | 80, 100                              |                                      |                                      |                                      |                                    |                           |
|                                                                                                                                                                                                 |                                                                | 100                                  | 100                                  |                                      |                                      |                                      |                                    |                           |
| CA_n79D                                                                                                                                                                                         | -                                                              | 100                                  | 100                                  | 100                                  |                                      |                                      | 300                                | 0                         |
| CA_n96B                                                                                                                                                                                         | CA_n96B                                                        | 20, 40                               | 20, 40, 60, 80                       |                                      |                                      |                                      | 100                                | 0                         |
| CA_n96C                                                                                                                                                                                         | CA_n96C                                                        | 80                                   | 40, 60, 80                           |                                      |                                      |                                      | 160                                | 0                         |
| CA_n96D                                                                                                                                                                                         | -                                                              | 80                                   | 80                                   | 60, 80                               |                                      |                                      | 240                                | 0                         |
| CA_n96E                                                                                                                                                                                         | -                                                              | 80                                   | 80                                   | 80                                   | 80                                   |                                      | 320                                | 0                         |
| NOTE 1: For each channel bandwidth of each component carrier, refer to Table 5.3.5-1 for the applicable SCSs. For a given band, not all UE channel bandwidths support the same SCSs.            |                                                                |                                      |                                      |                                      |                                      |                                      |                                    |                           |
| NOTE 2: The aggregated bandwidth must be greater than or equal to the minimum for the bandwidth class defined in Table 5.3A.5-1, and smaller than or equal to the maximum aggregated bandwidth. |                                                                |                                      |                                      |                                      |                                      |                                      |                                    |                           |
| NOTE 3: Minimum requirements for Power Class 2 are applicable for this uplink combination or single uplink carrier in this downlink/uplink combination                                          |                                                                |                                      |                                      |                                      |                                      |                                      |                                    |                           |
| NOTE 4: Minimum requirements for Power Class 1.5 are applicable for this uplink combination or single uplink carrier in this downlink/uplink combination                                        |                                                                |                                      |                                      |                                      |                                      |                                      |                                    |                           |
| NOTE 5: Only single uplink carriers with power class other than PC3 are listed.                                                                                                                 |                                                                |                                      |                                      |                                      |                                      |                                      |                                    |                           |

Table 5.5A.1-2: Void

## 5.5A.2 Configurations for intra-band non-contiguous CA

Table 5.5A.2-1: NR CA configurations and bandwidth combination sets defined for intra-band non-contiguous CA

| NR CA Configuration | Uplink CA Configurations or single uplink carrier <sup>5</sup> | Channel bandwidths for carrier (MHz)                         | Channel bandwidths for carrier (MHz) | Channel bandwidths for carrier (MHz) | Channel bandwidths for carrier (MHz) | Maximum Aggregated bandwidth (MHz) | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|--------------------------------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|------------------------------------|---------------------------|
| CA_n1(2A)           | -                                                              | 5, 10, 15, 20                                                | 5, 10, 15, 20                        |                                      |                                      | 40                                 | 0                         |
| CA_n2(2A)           | -                                                              | 5, 10, 15, 20                                                | 5, 10, 15, 20                        |                                      |                                      | 40                                 | 0                         |
| CA_n3(2A)           | -                                                              | 5, 10, 15, 20                                                | 5, 10, 15, 20                        |                                      |                                      | 40                                 | 0                         |
|                     | -                                                              | 5, 10, 15, 20, 25, 30                                        | 5, 10, 15, 20, 25, 30                |                                      |                                      | 60                                 | 1                         |
| CA_n5(2A)           | -                                                              | 5, 10, 15, 20                                                | 5, 10, 15, 20                        |                                      |                                      | 25                                 | 0                         |
| CA_n7(2A)           | -                                                              | 5, 10, 15, 20                                                | 5, 10, 15, 20                        |                                      |                                      | 40                                 | 0                         |
| CA_n12(2A)          | -                                                              | 5                                                            | 5                                    |                                      |                                      | 10                                 | 0                         |
| CA_n25(2A)          | -                                                              | 5, 10, 15, 20                                                | 5, 10, 15, 20                        |                                      |                                      | 40                                 | 0                         |
|                     |                                                                | 5, 10, 15, 20, 25, 30, 40                                    | 5, 10, 15, 20, 25, 30, 40            |                                      |                                      | 60                                 | 1                         |
|                     |                                                                | See n25 channel bandwidths in Table 5.3.5-1 for each carrier |                                      |                                      |                                      | 60                                 | 4 and 5                   |
| CA_n25(3A)          | -                                                              | 5, 10, 15, 20, 25, 30, 40                                    | 5, 10, 15, 20, 25, 30, 40            | 5, 10, 15, 20, 25, 30, 40            |                                      | 55                                 | 0                         |

| NR CA Configuration | Uplink CA Configurations or single uplink carrier <sup>5</sup> | Channel bandwidths for carrier (MHz)                         | Channel bandwidths for carrier (MHz)        | Channel bandwidths for carrier (MHz)        | Channel bandwidths for carrier (MHz)        | Maximum Aggregated bandwidth (MHz) | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|--------------------------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|------------------------------------|---------------------------|
|                     |                                                                | See n25 channel bandwidths in Table 5.3.5-1 for each carrier |                                             |                                             |                                             | 55                                 | 4 and 5                   |
| CA_n41(2A)          | n41 <sup>3,4</sup><br>CA_n41(2A)<br><br>-                      | 40, 50, 60, 80, 100                                          | 40, 50, 60, 80, 100                         |                                             |                                             | 180                                | 0                         |
|                     |                                                                | 10, 15, 20, 40, 50, 60, 80, 90, 100                          | 10, 15, 20, 40, 50, 60, 80, 90, 100         |                                             |                                             | 190                                | 1                         |
|                     |                                                                | 10, 15, 20, 30, 40, 50, 60, 80, 90                           | 15, 20, 30, 40, 50, 60, 80, 90, 100         |                                             |                                             | 190                                | 2                         |
|                     |                                                                | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100                  | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 |                                             |                                             | 190                                | 3                         |
|                     |                                                                | See n41 channel bandwidths in Table 5.3.5-1 for each carrier |                                             |                                             |                                             | 190                                | 4 and 5                   |
| CA_n41(3A)          | n41 <sup>3,4</sup>                                             | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100                  | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 |                                             | 190                                | 0                         |
|                     |                                                                | See n41 channel bandwidths in Table 5.3.5-1 for each carrier |                                             |                                             |                                             | 190                                | 4 and 5                   |
| CA_n41(4A)          | n41 <sup>3</sup>                                               | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100                  | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 | 190                                | 0                         |
|                     |                                                                | See n41 channel bandwidths in Table 5.3.5-1 for each carrier |                                             |                                             |                                             | 190                                | 4 and 5                   |
| CA_n48(2A)          | -                                                              | 10, 15, 20, 40, 50, 60, 80, 90, 100                          | 10, 15, 20, 40, 50, 60, 80, 90, 100         |                                             |                                             | 140 <sup>2</sup>                   | 0                         |
|                     |                                                                | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100                  | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 |                                             |                                             | 140 <sup>2</sup>                   | 1                         |
| CA_n48(3A)          | -                                                              | 10, 15, 20, 40, 50, 60, 80, 90, 100                          | 10, 15, 20, 40, 50, 60, 80, 90, 100         | 10, 15, 20, 40, 50, 60, 80, 90, 100         |                                             | 140 <sup>2</sup>                   | 0                         |
|                     |                                                                | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100                  | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 |                                             | 140 <sup>2</sup>                   | 1                         |
| CA_n48(4A)          | -                                                              | 10, 15, 20, 40, 50, 60, 80, 90, 100                          | 10, 15, 20, 40, 50, 60, 80, 90, 100         | 10, 15, 20, 40, 50, 60, 80, 90, 100         | 10, 15, 20, 40, 50, 60, 80, 90, 100         | 135 <sup>2</sup>                   | 0                         |
|                     |                                                                | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100                  | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 | 135 <sup>2</sup>                   | 1                         |
| CA_n66(2A)          | -                                                              | 5, 10, 15, 20                                                | 5, 10, 15, 20, 40                           |                                             |                                             | 60                                 | 0                         |
|                     |                                                                | 5, 10, 15, 20, 25, 30, 40                                    | 5, 10, 15, 20, 25, 30, 40                   |                                             |                                             | 80                                 | 1                         |
|                     |                                                                | 5, 10, 15, 20, 40                                            | 5, 10, 15, 20, 40                           |                                             |                                             | 80                                 | 2                         |
|                     |                                                                | See n66 channel bandwidths in Table 5.3.5-1 for each carrier |                                             |                                             |                                             | 85                                 | 4 and 5                   |
| CA_n66(3A)          | -                                                              | 5, 10, 15, 20, 40                                            | 5, 10, 15, 20, 40                           | 5, 10, 15, 20, 40                           |                                             | 80                                 | 0                         |



| NR CA Configuration | Uplink CA Configurations or single uplink carrier <sup>5</sup> | Channel bandwidths for carrier (MHz)                                                  | Channel bandwidths for carrier (MHz)            | Channel bandwidths for carrier (MHz)            | Channel bandwidths for carrier (MHz) | Maximum Aggregated bandwidth (MHz) | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------------------------------------------------------------------------------------|-------------------------------------------------|-------------------------------------------------|--------------------------------------|------------------------------------|---------------------------|
| CA_n71(2A)          | -                                                              | 5, 10, 15, 20                                                                         | 5,10,15, 20                                     |                                                 |                                      | 30                                 | 0                         |
|                     |                                                                | See n71 channel bandwidths in Table 5.3.5-1 for each carrier up to 25 MHz per carrier |                                                 |                                                 |                                      | 30                                 | 4 and 5                   |
| CA_n77(2A)          | n77 <sup>3,4</sup><br>CA_n77(2A)                               | 20, 40, 80, 100                                                                       | 20, 40, 80, 100                                 |                                                 |                                      | 200                                | 0                         |
|                     |                                                                | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                       | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                                                 |                                      | 200                                | 1                         |
|                     |                                                                | See n77 channel bandwidths in Table 5.3.5-1 for each carrier                          |                                                 |                                                 |                                      | 200                                | 4 and 5                   |
| CA_n77(3A)          | n77                                                            | 20, 40, 80, 100                                                                       | 20, 40, 80, 100                                 | 20, 40, 80, 100                                 |                                      | 300                                | 0                         |
|                     |                                                                | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                       | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                                      | 300                                | 1                         |
| CA_n78(2A)          | n78<br>CA_n78(2A)                                              | 10, 20, 40, 50, 60, 80, 90, 100                                                       | 10, 20, 40, 50, 60, 80, 90, 100                 |                                                 |                                      | 200                                | 0                         |
|                     |                                                                | 10, 20, 25, 30, 40, 50, 60, 80, 90, 100                                               | 10, 20, 25, 30, 40, 50, 60, 80, 90, 100         |                                                 |                                      | 200                                | 1                         |
|                     |                                                                | 10, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                           | 10, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100     |                                                 |                                      | 200                                | 2                         |
| CA_n96(2A)          | -                                                              | 20, 40, 60, 80                                                                        | 20, 40, 60, 80                                  |                                                 |                                      | 160                                | 0                         |
| CA_n96(3A)          | -                                                              | 20, 40, 60, 80                                                                        | 20, 40, 60, 80                                  | 20, 40, 60, 80                                  |                                      | 240                                | 0                         |
| CA_n96(4A)          | -                                                              | 20, 40, 60, 80                                                                        | 20, 40, 60, 80                                  | 20, 40, 60, 80                                  | 20, 40, 60, 80                       | 320                                | 0                         |

NOTE 1: Void.

NOTE 2: Parameter value accounts for both, the maximum frequency range of band n48 (150 MHz), and the minimum frequency gaps in between NR non-contiguous component carriers.

NOTE 3: Minimum requirements for Power Class 2 are applicable for this uplink combination or single uplink carrier in this downlink/uplink combination

NOTE 4: Minimum requirements for Power Class 1.5 are applicable for this uplink combination or single uplink carrier in this downlink/uplink combination

NOTE 5: Only single uplink carriers with power class other than PC3 are listed.

NOTE 6: For each channel bandwidth of each component carrier, refer to Table 5.3.5-1 for the applicable SCSs. For a given band, not all UE channel bandwidths support the same SCSs.

Table 5.5A.2-2: NR CA configurations and bandwidth combination sets defined for mixed intra-band contiguous and non-contiguous CA

| NR CA configuration                                                                                                                                                                  | Uplink CA configuration or single uplink carrier <sup>4</sup> | NR Band | Channel bandwidth (MHz)                                            |    |    |    |    |    |    |                 |                 |                 |                 |                 |                  | Bandwidth combination set |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|---------|--------------------------------------------------------------------|----|----|----|----|----|----|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|---------------------------|
|                                                                                                                                                                                      |                                                               |         | 5                                                                  | 10 | 15 | 20 | 25 | 30 | 40 | 50              | 60              | 70              | 80              | 90              | 100              |                           |
| CA_n41(A-C)                                                                                                                                                                          | n41 <sup>2,3</sup>                                            | n41     |                                                                    | 10 | 15 | 20 |    | 30 | 40 | 50              | 60              | 70              | 80              | 90              | 100              | 0                         |
|                                                                                                                                                                                      |                                                               | n41     | See CA_n41C Bandwidth Combination Set 2 in Table 5.5A.1-1          |    |    |    |    |    |    |                 |                 |                 |                 |                 |                  | 4 and 5                   |
|                                                                                                                                                                                      |                                                               | n41     | See n41 channel bandwidths in Table 5.3.5-1                        |    |    |    |    |    |    |                 |                 |                 |                 |                 |                  |                           |
|                                                                                                                                                                                      |                                                               | n41     | See CA_n41C Bandwidth Combination Set 4 and 5 in Table 5.5A.1-1    |    |    |    |    |    |    |                 |                 |                 |                 |                 |                  |                           |
| CA_n41(2A-C)                                                                                                                                                                         | -                                                             | n41     | See CA_n41(2A) Bandwidth Combination Set 3 in Table 5.5A.2-1       |    |    |    |    |    |    |                 |                 |                 |                 |                 |                  | 0                         |
|                                                                                                                                                                                      |                                                               | n41     | See CA_n41C Bandwidth Combination Set 1 in Table 5.5A.1-1          |    |    |    |    |    |    |                 |                 |                 |                 |                 |                  | 4 and 5                   |
|                                                                                                                                                                                      |                                                               | n41     | See CA_n41(2A) Bandwidth Combination Set 4 and 5 in Table 5.5A.2-1 |    |    |    |    |    |    |                 |                 |                 |                 |                 |                  |                           |
|                                                                                                                                                                                      |                                                               | n41     | See CA_n41C Bandwidth Combination Set 4 and 5 in Table 5.5A.1-1    |    |    |    |    |    |    |                 |                 |                 |                 |                 |                  |                           |
| CA_n48(A-B)                                                                                                                                                                          | CA_n48B                                                       | n48     | 5                                                                  | 10 | 15 | 20 |    |    | 40 | 50 <sup>1</sup> | 60 <sup>1</sup> |                 | 80 <sup>1</sup> | 90 <sup>1</sup> | 100 <sup>1</sup> | 0                         |
|                                                                                                                                                                                      |                                                               | n48     | See CA_n48B Bandwidth Combination Set 0 in Table 5.5A.1-1          |    |    |    |    |    |    |                 |                 |                 |                 |                 |                  | 1                         |
|                                                                                                                                                                                      | CA_n48B                                                       | n48     | 5                                                                  | 10 | 15 | 20 |    | 30 | 40 | 50 <sup>1</sup> | 60 <sup>1</sup> | 70 <sup>1</sup> | 80 <sup>1</sup> | 90 <sup>1</sup> | 100 <sup>1</sup> |                           |
|                                                                                                                                                                                      |                                                               | n48     | See CA_n48B Bandwidth Combination Set 2 in Table 5.5A.1-1          |    |    |    |    |    |    |                 |                 |                 |                 |                 |                  |                           |
| NOTE 1: This UE channel bandwidth is applicable only to downlink                                                                                                                     |                                                               |         |                                                                    |    |    |    |    |    |    |                 |                 |                 |                 |                 |                  |                           |
| NOTE 2: Minimum requirements for Power Class 2 are applicable for this uplink combination or single uplink carrier in this downlink/uplink combination                               |                                                               |         |                                                                    |    |    |    |    |    |    |                 |                 |                 |                 |                 |                  |                           |
| NOTE 3: Minimum requirements for Power Class 1.5 are applicable for this uplink combination or single uplink carrier in this downlink/uplink combination                             |                                                               |         |                                                                    |    |    |    |    |    |    |                 |                 |                 |                 |                 |                  |                           |
| NOTE 4: Only single uplink carriers with power class other than PC3 are listed.                                                                                                      |                                                               |         |                                                                    |    |    |    |    |    |    |                 |                 |                 |                 |                 |                  |                           |
| NOTE 5: For each channel bandwidth of each component carrier, refer to Table 5.3.5-1 for the applicable SCSs. For a given band, not all UE channel bandwidths support the same SCSs. |                                                               |         |                                                                    |    |    |    |    |    |    |                 |                 |                 |                 |                 |                  |                           |

5.5A.3 Configurations for inter-band CA

Table 5.5A.3-1: Void

Table 5.5A.3-2: Void

Table 5.5A.3-3: Void

5.5A.3.1 Configurations for inter-band CA (two bands)

**Table 5.5A.3.1-1a: NR CA configurations and bandwidth combinations sets defined for inter-band CA (two bands)**

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)      | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|---------------------------------------|---------------------------|
| CA_n1A-n3A          | CA_n1A-n3A                                                     | n1      | 5, 10, 15, 20                         | 0                         |
|                     |                                                                | n3      | 5, 10, 15, 20, 25, 30                 |                           |
|                     |                                                                | n1      | 5, 10, 15, 20, 25, 30, 40, 50         | 1                         |
|                     |                                                                | n3      | 5, 10, 15, 20, 25, 30, 40             |                           |
| CA_n1A-n3B          | -                                                              | n1      | 5, 10, 15, 20                         | 0                         |
|                     |                                                                | n3      | CA_n3B_BCS0                           |                           |
| CA_n1B-n3A          | CA_n1A-n3A                                                     | n1      | CA_n1B_BCS0                           | 0                         |
|                     |                                                                | n3      | 5, 10, 15, 20, 25, 30                 |                           |
|                     |                                                                | n1      | CA_n1B_BCS0                           | 1                         |
|                     |                                                                | n3      | 5, 10, 15, 20, 25, 30, 40             |                           |
| CA_n1A-n3(2A)       | CA_n1A-n3A                                                     | n1      | 5, 10, 15, 20                         | 0                         |
|                     |                                                                | n3      | CA_n3(2A)_BCS0                        |                           |
|                     |                                                                | n1      | 5, 10, 15, 20, 25, 30, 40, 50         | 1                         |
|                     |                                                                | n3      | CA_n3(2A)_BCS0                        |                           |
|                     |                                                                | n1      | 5, 10, 15, 20                         | 2                         |
|                     |                                                                | n3      | CA_n3(2A)_BCS1                        |                           |
| CA_n1(2A)-n3A       | -                                                              | n1      | CA_n1(2A)_BCS0                        | 0                         |
|                     |                                                                | n3      | 5, 10, 15, 20, 25, 30, 40             |                           |
| CA_n1(2A)-n3(2A)    | -                                                              | n1      | CA_n1(2A)_BCS0                        | 0                         |
|                     |                                                                | n3      | CA_n3(2A)_BCS1                        |                           |
| CA_n1(2A)-n3B       | -                                                              | n1      | CA_n1(2A)_BCS0                        | 0                         |
|                     |                                                                | n3      | CA_n3B_BCS0                           |                           |
| CA_n1A-n5A          | CA_n1A-n5A                                                     | n1      | 5, 10, 15, 20, 25, 30, 40, 50         | 0                         |
|                     |                                                                | n5      | 5, 10, 15, 20                         |                           |
| CA_n1(2A)-n5A       | -                                                              | n1      | CA_n1(2A)_BCS0                        | 0                         |
|                     |                                                                | n5      | 5, 10, 15, 20                         |                           |
| CA_n1A-n7A          | CA_n1A-n7A                                                     | n1      | 5, 10, 15, 20                         | 0                         |
|                     |                                                                | n7      | 5, 10, 15, 20, 25, 30, 40, 50         |                           |
|                     |                                                                | n1      | 5, 10, 15, 20, 25, 30, 40, 50         | 1                         |
|                     |                                                                | n7      | 5, 10, 15, 20, 25, 30, 40, 50         |                           |
| CA_n1A-n7B          | CA_n1A-n7A<br>CA_n7B                                           | n1      | 5, 10, 15, 20                         | 0                         |
|                     |                                                                | n7      | CA_n7B_BCS0                           |                           |
| CA_n1(2A)-n7A       | -                                                              | n1      | CA_n1(2A)_BCS0                        | 0                         |
|                     |                                                                | n7      | 5, 10, 15, 20, 25, 30, 40, 50         |                           |
| CA_n1A-n8A          | CA_n1A-n8A                                                     | n1      | 5, 10, 15, 20                         | 0                         |
|                     |                                                                | n8      | 5, 10, 15, 20                         |                           |
|                     |                                                                | n1      | 5, 10, 15, 20, 25, 30, 40             | 1                         |
|                     |                                                                | n8      | 5, 10, 15, 20                         |                           |
| CA_n1(2A)-n8A       | -                                                              | n1      | CA_n1(2A)_BCS0                        | 0                         |
|                     |                                                                | n8      | 5, 10, 15, 20                         |                           |
| CA_n1A-n18A         | CA_n1A-n18A                                                    | n1      | 5, 10, 15, 20, 25, 30, 40, 50         | 0                         |
|                     |                                                                | n18     | 5, 10, 15                             |                           |
| CA_n1A-n20A         | CA_n1A-n20A                                                    | n1      | 5, 10, 15, 20, 25, 30, 40, 50         | 0                         |
|                     |                                                                | n20     | 5, 10, 15, 20                         |                           |
| CA_n1A-n28A         | CA_n1A-n28A                                                    | n1      | 5, 10, 15, 20                         | 0                         |
|                     |                                                                | n28     | 5, 10, 15, 20                         |                           |
|                     |                                                                | n1      | 5, 10, 15, 20, 25, 30, 40, 50         | 1                         |
|                     |                                                                | n28     | 5, 10, 15, 20, 30                     |                           |
| CA_n1(2A)-n28A      | -                                                              | n1      | CA_n1(2A)_BCS0                        | 0                         |
|                     |                                                                | n28     | 5, 10, 15, 20                         |                           |
| CA_n1A-n38A         | -                                                              | n1      | 5, 10, 15, 20, 25, 30, 40, 50         | 0                         |
|                     |                                                                | n38     | 5, 10, 15, 20, 25, 30, 40             |                           |
| CA_n1(2A)-n38A      | -                                                              | n1      | CA_n1(2A)_BCS0                        | 0                         |
|                     |                                                                | n38     | 5, 10, 15, 20, 25, 30, 40             |                           |
| CA_n1A-n40A         | CA_n1A-n40A                                                    | n1      | 5, 10, 15, 20                         | 0                         |
|                     |                                                                | n40     | 5, 10, 15, 20, 25, 30, 40, 50, 60, 80 |                           |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
| CA_n1A-n40B         | -                                                              | n1      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n40     | CA_n40B_BCS0                                    |                           |
| CA_n1A-n41A         | CA_n1A-n41A                                                    | n1      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n41     | 10, 15, 20, 40, 50, 60, 80, 90, 100             |                           |
|                     |                                                                | n1      | 5, 10, 15, 20, 25, 30, 40, 50                   | 1                         |
|                     |                                                                | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100         |                           |
| CA_n1A-n67A         | -                                                              | n1      | 5, 10, 15, 20, 25, 30, 40, 50                   | 0                         |
|                     |                                                                | n67     | 5, 10, 15, 20                                   |                           |
| CA_n1A-n74A         | CA_n1A-n74A                                                    | n1      | 5, 10, 15, 20, 25, 30, 40, 50                   | 0                         |
|                     |                                                                | n74     | 5, 10, 15, 20                                   |                           |
| CA_n1A-n77A         | CA_n1A-n77A                                                    | n1      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n77     | 10, 15, 20, 40, 50, 60, 80, 90, 100             |                           |
| CA_n1A-n77(2A)      | CA_n1A-n77A                                                    | n1      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n77     | CA_n77(2A)_BCS0                                 |                           |
| CA_n1A-n77(3A)      | CA_n1A-n77A                                                    | n1      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n77     | CA_n77(3A)_BCS1                                 |                           |
| CA_n1A-n78A         | n78 <sup>8</sup><br>CA_n1A-n78A <sup>8</sup>                   | n1      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100             |                           |
|                     |                                                                | n1      | 5, 10, 15, 20, 25, 30, 40, 50                   | 1                         |
|                     |                                                                | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                     |                                                                | n1      | 5, 10, 15, 20, 25, 30, 40                       | 2                         |
|                     |                                                                | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100             |                           |
|                     |                                                                | n1      | 5, 10, 15, 20                                   | 3                         |
| CA_n1A-n78(2A)      | CA_n1A-n78A                                                    | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 0                         |
|                     |                                                                | n1      | 5, 10, 15, 20                                   |                           |
|                     |                                                                | n78     | CA_n78(2A)_BCS0                                 | 1                         |
|                     |                                                                | n1      | 5, 10, 15, 20, 25, 30, 40, 50                   |                           |
|                     |                                                                | n78     | CA_n78(2A)_BCS1                                 | 2                         |
|                     |                                                                | n1      | 5, 10, 15, 20                                   |                           |
| CA_n1A-n78C         | CA_n78C<br>CA_n1A-n78A                                         | n78     | CA_n78(2A)_BCS2                                 | 0                         |
|                     |                                                                | n1      | 5, 10, 15, 20                                   |                           |
|                     |                                                                | n78     | CA_n78C_BCS0                                    | 1                         |
|                     |                                                                | n1      | 5, 10, 15, 20, 25, 30, 40, 50                   |                           |
|                     |                                                                | n78     | CA_n78C_BCS0                                    | 2                         |
|                     |                                                                | n1      | 5, 10, 15, 20, 25, 30, 40                       |                           |
| CA_n1(2A)-n78A      | -                                                              | n78     | CA_n78C_BCS0                                    | 0                         |
|                     |                                                                | n1      | 5, 10, 15, 20, 25, 30, 40, 50                   |                           |
| CA_n1(2A)-n78A      | -                                                              | n78     | CA_n1(2A)_BCS0                                  | 0                         |
|                     |                                                                | n1      | 5, 10, 15, 20                                   |                           |
| CA_n1A-n79A         | CA_n1A-n79A                                                    | n79     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 0                         |
|                     |                                                                | n1      | 5, 10, 15, 20                                   |                           |
| CA_n1A-n79C         | CA_n1A-n79A                                                    | n79     | 40, 50, 60, 80, 100                             | 0                         |
|                     |                                                                | n1      | 5, 10, 15, 20                                   |                           |
| CA_n1(2A)-n79A      | -                                                              | n79     | CA_n79C_BCS0                                    | 0                         |
|                     |                                                                | n1      | CA_n1(2A)_BCS0                                  |                           |
| CA_n1(2A)-n79C      | -                                                              | n79     | 40, 60, 80, 100                                 | 0                         |
|                     |                                                                | n1      | CA_n1(2A)_BCS0                                  |                           |
| CA_n1(2A)-n79C      | -                                                              | n79     | CA_n1(2A)_BCS0                                  | 0                         |
|                     |                                                                | n1      | CA_n79C_BCS0                                    |                           |

**Table 5.5A.3.1-1b: NR CA configurations and bandwidth combinations sets defined for inter-band CA (two bands)**

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3) | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|----------------------------------|---------------------------|
| CA_n2A-n5A          | CA_n2A-n5A                                                     | n2      | 5, 10, 15, 20                    | 0                         |
|                     |                                                                | n5      | 5, 10, 15, 20                    |                           |
| CA_n2A-n5B          | CA_n2A-n5A<br>CA_n5B                                           | n2      | 5, 10, 15, 20                    | 0                         |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                                                                            | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|-------------------------------------------------------------------------------------------------------------|---------------------------|
|                     |                                                                | n5      | CA n5B BCS0                                                                                                 |                           |
| CA_n2(2A)-n5A       | CA_n2A-n5A                                                     | n2      | CA_n2(2A)_BCS0                                                                                              | 0                         |
|                     |                                                                | n5      | 5, 10, 15, 20                                                                                               |                           |
| CA_n2A-n7A          | CA_n2A-n7A                                                     | n2      | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                                                               |                           |
| CA_n2A-n7(2A)       | CA_n2A-n7A                                                     | n2      | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n7      | CA_n7(2A)_BCS0                                                                                              |                           |
| CA_n2A-n12A         | CA_n2A-n12A                                                    | n2      | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n12     | 5, 10, 15                                                                                                   |                           |
| CA_n2(2A)-n12A      | CA_n2A-n12A                                                    | n2      | CA_n2(2A)_BCS0                                                                                              | 0                         |
|                     |                                                                | n12     | 5, 10, 15                                                                                                   |                           |
| CA_n2A-n14A         | CA_n2A-n14A                                                    | n2      | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n14     | 5, 10                                                                                                       |                           |
| CA_n2(2A)-n14A      | CA_n2A-n14A                                                    | n2      | CA_n2(2A)_BCS0                                                                                              | 0                         |
|                     |                                                                | n14     | 5, 10                                                                                                       |                           |
| CA_n2A-n29A         | -                                                              | n2      | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n29     | 5, 10                                                                                                       |                           |
| CA_n2(2A)-n29A      | -                                                              | n2      | CA_n2(2A)_BCS0                                                                                              | 0                         |
|                     |                                                                | n29     | 5, 10                                                                                                       |                           |
| CA_n2A-n30A         | CA_n2A-n30A                                                    | n2      | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n30     | 5, 10                                                                                                       |                           |
| CA_n2(2A)-n30A      | CA_n2A-n30A                                                    | n2      | CA_n2(2A)_BCS0                                                                                              | 0                         |
|                     |                                                                | n30     | 5, 10                                                                                                       |                           |
| CA_n2A-n38A         | -                                                              | n2      | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n38     | 5, 10, 15, 20, 40                                                                                           |                           |
| CA_n2A-n41A         | -                                                              | n2      | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n41     | 10, 15, 20, 40, 50, 60, 80, 90, 100                                                                         |                           |
| CA_n2A-n48A         | CA_n2A-n48A                                                    | n2      | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n48     | 5, 10, 15, 20, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> |                           |
| CA_n2A-n48B         | CA_n2A-n48A                                                    | n2      | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n48     | CA_n48B_BCS0                                                                                                |                           |
| CA_n2A-n48C         | CA_n2A-n48A                                                    | n2      | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n48     | CA_n48C_BCS0                                                                                                |                           |
| CA_n2A-n48(2A)      | CA_n2A-n48A                                                    | n2      | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n48     | CA_n48(2A)_BCS0                                                                                             |                           |
| CA_n2A-n48(A-B)     | CA_n2A-n48A                                                    | n2      | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n48     | CA_n48(A-B)_BCS0                                                                                            |                           |
|                     |                                                                | n2      | 5, 10, 15, 20                                                                                               | 1                         |
|                     |                                                                | n48     | CA_n48(A-B)_BCS1                                                                                            |                           |
| CA_n2A-n66A         | -                                                              | n2      | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 40                                                                                           |                           |
|                     | CA_n2A-n66A                                                    | n2      | 5, 10, 15, 20                                                                                               | 1                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                   |                           |
| CA_n2(2A)-n66A      | CA_n2A-n66A                                                    | n2      | CA_n2(2A)_BCS0                                                                                              | 0                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                   |                           |
| CA_n2A-n66(2A)      | CA_n2A-n66A                                                    | n2      | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n66     | CA_n66(2A)_BCS1                                                                                             |                           |
| CA_n2(2A)-n66(2A)   | CA_n2A-n66A                                                    | n2      | CA_n2(2A)_BCS0                                                                                              | 0                         |
|                     |                                                                | n66     | CA_n66(2A)_BCS1                                                                                             |                           |
| CA_n2(2A)-n66(3A)   | CA_n2A-n66A                                                    | n2      | CA_n2(2A)_BCS0                                                                                              | 0                         |
|                     |                                                                | n66     | CA_n66(3A)_BCS0                                                                                             |                           |
| CA_n2A-n66(3A)      | CA_n2A-n66A                                                    | n2      | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n66     | CA_n66(3A)_BCS0                                                                                             |                           |
| CA_n2A-n66B         | CA_n2A-n66A                                                    | n2      | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n66     | CA_n66B_BCS0                                                                                                |                           |
| CA_n2A-n71A         | -                                                              | n2      | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n71     | 5, 10, 15, 20                                                                                               |                           |
| CA_n2A-n77A         | n77 <sup>8,9</sup><br>CA_n2A-n77A <sup>8</sup>                 | n2      | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                             |                           |
| CA_n2A-n77(2A)      | n77 <sup>8,9</sup><br>CA_n2A-n77A <sup>8</sup>                 | n2      | 5, 10, 15, 20                                                                                               | 0                         |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup>          | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|---------------------|-------------------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
|                     | CA_n77(2A) <sup>7</sup>                                                 |         |                                                 | 1                         |
|                     |                                                                         | n77     | CA_n77(2A)_BCS0                                 |                           |
|                     |                                                                         | n2      | 5, 10, 15, 20                                   |                           |
|                     |                                                                         | n77     | CA_n77(2A)_BCS1                                 |                           |
| CA_n2A-n77C         | n77 <sup>8</sup><br>CA_n2A-n77A <sup>8</sup>                            | n2      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                         | n77     | CA_n77C_BCS0                                    |                           |
| CA_n2(2A)-n77A      | n77 <sup>8,9</sup><br>CA_n2A-n77A <sup>8</sup>                          | n2      | CA_n2(2A)_BCS0                                  | 0                         |
|                     |                                                                         | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n2(2A)-n77(2A)   | n77 <sup>8</sup><br>CA_n2A-n77A <sup>8</sup><br>CA_n77(2A) <sup>7</sup> | n2      | CA_n2(2A)_BCS0                                  | 0                         |
|                     |                                                                         | n77     | CA_n77(2A)_BCS1                                 |                           |
| CA_n2(2A)-n77C      | n77 <sup>8</sup><br>CA_n2A-n77A <sup>8</sup>                            | n2      | CA_n2(2A)_BCS0                                  | 0                         |
| CA_n2A-n78A         | CA_n2A-n78A                                                             | n77     | CA_n77C_BCS1                                    | 0                         |
|                     |                                                                         | n2      | 5, 10, 15, 20                                   |                           |
|                     |                                                                         | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100     | 1                         |
|                     |                                                                         | n2      | 5, 10, 15, 20                                   |                           |
| CA_n2A-n78(2A)      | CA_n2A-n78A                                                             | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 0                         |
|                     |                                                                         | n2      | 5, 10, 15, 20                                   |                           |
|                     |                                                                         | n78     | CA_n78(2A)_BCS1                                 | 1                         |
|                     |                                                                         | n2      | 5, 10, 15, 20                                   |                           |
|                     |                                                                         | n78     | CA_n78(2A)_BCS2                                 |                           |
|                     |                                                                         |         |                                                 |                           |

**Table 5.5A.3.1-1c: NR CA configurations and bandwidth combinations sets defined for inter-band CA (two bands)**

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3) | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|----------------------------------|---------------------------|
| CA_n3A-n5A          | CA_n3A-n5A                                                     | n3      | 5, 10, 15, 20, 25, 30, 40, 50    | 0                         |
|                     |                                                                | n5      | 5, 10, 15, 20                    |                           |
| CA_n3(2A)-n5A       | -                                                              | n3      | CA_n3(2A)_BCS0                   | 0                         |
|                     |                                                                | n5      | 5, 10, 15, 20                    |                           |
| CA_n3A-n7A          | CA_n3A-n7A                                                     | n3      | 5, 10, 15, 20, 25, 30            | 0                         |
|                     |                                                                | n7      | 5, 10, 15, 20, 25, 30, 40, 50    |                           |
|                     |                                                                | n3      | 5, 10, 15, 20, 25, 30, 40        | 1                         |
|                     |                                                                | n7      | 5, 10, 15, 20, 25, 30, 40, 50    |                           |
| CA_n3A-n7B          | CA_n3A-n7A<br>CA_n7B                                           | n3      | 5, 10, 15, 20, 25, 30            | 0                         |
|                     |                                                                | n7      | CA_n7B_BCS0                      |                           |
|                     |                                                                | n3      | 5, 10, 15, 20, 25, 30, 40        | 1                         |
|                     |                                                                | n7      | CA_n7B_BCS0                      |                           |
| CA_n3(2A)-n7A       | -                                                              | n3      | CA_n3(2A)_BCS0                   | 0                         |
|                     |                                                                | n7      | 5, 10, 15, 20, 25, 30, 40, 50    |                           |
|                     |                                                                | n3      | CA_n3(2A)_BCS1                   | 1                         |
|                     |                                                                | n7      | 5, 10, 15, 20, 25, 30, 40, 50    |                           |
| CA_n3B-n7A          | -                                                              | n3      | CA_n3B_BCS0                      | 0                         |
|                     |                                                                | n7      | 5, 10, 15, 20, 25, 30, 40, 50    |                           |
| CA_n3A-n8A          | CA_n3A-n8A                                                     | n3      | 5, 10, 15, 20, 25, 30            | 0                         |
|                     |                                                                | n8      | 5, 10, 15, 20                    |                           |
|                     |                                                                | n3      | 5, 10, 15, 20, 25, 30, 40, 50    | 1                         |
|                     |                                                                | n8      | 5, 10, 15, 20                    |                           |
| CA_n3(2A)-n8A       | -                                                              | n3      | CA_n3(2A)_BCS0                   | 0                         |
|                     |                                                                | n8      | 5, 10, 15, 20                    |                           |
| CA_n3A-n18A         | CA_n3A-n18A                                                    | n3      | 5, 10, 15, 20, 25, 30, 40        | 0                         |
|                     |                                                                | n18     | 5, 10, 15                        |                           |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
| CA_n3A-n20A         | CA_n3A-n20A                                                    | n3      | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                     |                                                                | n20     | 5, 10, 15, 20                                   |                           |
| CA_n3A-n28A         | CA_n3A-n28A                                                    | n3      | 5, 10, 15, 20, 25, 30                           | 0                         |
|                     |                                                                | n28     | 5, 10, 15, 20                                   |                           |
|                     |                                                                | n3      | 5, 10, 15, 20, 25, 30, 40                       | 1                         |
|                     |                                                                | n28     | 5, 10, 15, 20                                   |                           |
|                     |                                                                | n3      | 5, 10, 15, 20, 25, 30, 40, 50                   | 2                         |
|                     |                                                                | n28     | 5, 10, 15, 20, 30                               |                           |
| CA_n3(2A)-n28A      | -                                                              | n3      | CA_n3(2A)_BCS0                                  | 0                         |
|                     |                                                                | n28     | 5, 10, 15, 20                                   |                           |
| CA_n3A-n34A         | CA_n3A-n34A                                                    | n3      | 5, 10, 15, 20, 25, 30                           | 0                         |
|                     |                                                                | n34     | 5, 10, 15                                       |                           |
| CA_n3A-n38A         | CA_n3A-n38A                                                    | n3      | 5, 10, 15, 20, 25, 30                           | 0                         |
|                     |                                                                | n38     | 5, 10, 15, 20, 40                               |                           |
| CA_n3B-n38A         | -                                                              | n3      | CA_n3B_BCS0                                     | 0                         |
|                     |                                                                | n38     | 5, 10, 15, 20, 25, 30, 40                       |                           |
| CA_n3(2A)-n38A      | -                                                              | n3      | CA_n3(2A)_BCS1                                  | 0                         |
|                     |                                                                | n38     | 5, 10, 15, 20, 25, 30, 40                       |                           |
| CA_n3A-n40A         | CA_n3A-n40A                                                    | n3      | 5, 10, 15, 20, 25, 30                           | 0                         |
|                     |                                                                | n40     | 5, 10, 15, 20, 25, 30, 40, 50, 60, 80           |                           |
| CA_n3A-n41A         | n41 <sup>8</sup><br>CA_n3A-n41A <sup>8</sup>                   | n3      | 5, 10, 15, 20, 25, 30                           | 0                         |
|                     |                                                                | n41     | 10, 15, 20, 40, 50, 60, 80, 90, 100             |                           |
|                     |                                                                | n3      | 5, 10, 15, 20, 25, 30                           | 1                         |
|                     |                                                                | n41     | 10, 15, 20, 40, 50, 60                          |                           |
|                     |                                                                | n3      | 5, 10, 15, 20, 25, 30, 40                       | 2                         |
|                     |                                                                | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100         |                           |
| CA_n3A-n41B         | CA_n3A-n41A                                                    | n3      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n41     | CA_n41B_BCS0                                    |                           |
| CA_n3A-n41C         | CA_n3A-n41A                                                    | n3      | 5, 10, 15, 20, 25, 30                           | 0                         |
|                     |                                                                | n41     | CA_n41C_BCS0                                    |                           |
| CA_n3A-n41(2A)      | CA_n3A-n41A                                                    | n3      | 5, 10, 15, 20, 25, 30                           | 0                         |
|                     |                                                                | n41     | CA_n41(2A)_BCS0                                 |                           |
| CA_n3A-n67A         | -                                                              | n3      | 5, 10, 15, 20, 25, 30, 40, 50                   | 0                         |
|                     |                                                                | n67     | 5, 10, 15, 20                                   |                           |
| CA_n3A-n74A         | CA_n3A-n74A                                                    | n3      | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                     |                                                                | n74     | 5, 10, 15, 20                                   |                           |
| CA_n3A-n75A         | -                                                              | n3      | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                     |                                                                | n75     | 5, 10, 15, 20, 25, 30, 40, 50                   |                           |
| CA_n3A-n77A         | CA_n3A-n77A                                                    | n3      | 5, 10, 15, 20, 25, 30                           | 0                         |
|                     |                                                                | n77     | 10, 15, 20, 40, 50, 60, 80, 90, 100             |                           |
| CA_n3A-n77(2A)      | CA_n77(2A)<br>CA_n3A-n77A                                      | n3      | 5, 10, 15, 20, 25, 30                           | 0                         |
|                     |                                                                | n77     | CA_n77(2A)_BCS0                                 |                           |
| CA_n3A-n77(3A)      | CA_n3A-n77A                                                    | n3      | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                     |                                                                | n77     | CA_n77(3A)_BCS0                                 |                           |
| CA_n3A-n78A         | n78 <sup>8</sup><br>CA_n3A-n78A <sup>8</sup>                   | n3      | 5, 10, 15, 20, 25, 30                           | 0                         |
|                     |                                                                | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100             |                           |
|                     |                                                                | n3      | 5, 10, 15, 20, 25, 30, 40                       | 1                         |
|                     |                                                                | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n3A-n78C         | CA_n78C<br>CA_n3A-n78A                                         | n3      | 5, 10, 15, 20, 25, 30                           | 0                         |
|                     |                                                                | n78     | CA_n78C_BCS0                                    |                           |
|                     |                                                                | n3      | 5, 10, 15, 20, 25, 30, 40                       | 1                         |
|                     |                                                                | n78     | CA_n78C_BCS0                                    |                           |
| CA_n3A-n78(2A)      | CA_n3A-n78A<br>CA_n78(2A)                                      | n3      | 5, 10, 15, 20, 25, 30                           | 0                         |
|                     |                                                                | n78     | CA_n78(2A)_BCS0                                 |                           |
|                     | CA_n3A-n78A                                                    | n3      | 5, 10, 15, 20, 25, 30, 40                       | 1                         |
|                     |                                                                | n78     | CA_n78(2A)_BCS2                                 |                           |
| CA_n3(2A)-n78A      | -                                                              | n3      | CA_n3(2A)_BCS0                                  | 0                         |



| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
|                     |                                                                | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n3B-n78A         | -                                                              | n3      | CA_n3(2A)_BCS1                                  | 1                         |
|                     |                                                                | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                     |                                                                | n3      | CA_n3B_BCS0                                     |                           |
| CA_n3A-n79A         | CA_n3A-n79A                                                    | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 0                         |
|                     |                                                                | n3      | 5, 10, 15, 20, 25, 30                           |                           |
|                     |                                                                | n79     | 40, 50, 60, 80, 100                             |                           |
| CA_n3(2A)-n79A      | CA_n3A-n79A                                                    | n3      | 5, 10, 15, 20, 25, 30, 40, 50                   | 1                         |
|                     |                                                                | n79     | 40, 50, 60, 80, 100                             |                           |
|                     |                                                                | n3      | CA_n3(2A)_BCS1                                  |                           |
| CA_n3A-n79C         | CA_n3A-n79A                                                    | n79     | 40, 50, 60, 80, 100                             | 0                         |
|                     |                                                                | n3      | 5, 10, 15, 20, 25, 30                           |                           |
|                     |                                                                | n79     | CA_n79C_BCS0                                    |                           |
| CA_n3(2A)-n79C      | CA_n3A-n79A                                                    | n3      | CA_n3(2A)_BCS1                                  | 0                         |
|                     |                                                                | n79     | CA_n79C_BCS0                                    |                           |
|                     |                                                                | n3      | CA_n3B_BCS0                                     |                           |
| CA_n3B-n79A         | -                                                              | n79     | 40, 50, 60, 80, 100                             | 0                         |
|                     |                                                                | n3      | CA_n3B_BCS0                                     |                           |
|                     |                                                                | n79     | CA_n79C_BCS0                                    |                           |

**Table 5.5A.3.1-1d: NR CA configurations and bandwidth combinations sets defined for inter-band CA (two bands)**

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                                                                            | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|-------------------------------------------------------------------------------------------------------------|---------------------------|
| CA_n5A-n7A          | CA_n5A-n7A                                                     | n5      | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                                                               |                           |
| CA_n5A-n7B          | CA_n5A-n7A<br>CA_n7B                                           | n5      | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n7      | CA_n7B_BCS0                                                                                                 |                           |
| CA_n5A-n12A         | CA_n5A-n12A                                                    | n5      | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n12     | 5, 10, 15                                                                                                   |                           |
| CA_n5A-n14A         | CA_n5A-n14A                                                    | n5      | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n14     | 5, 10                                                                                                       |                           |
| CA_n5A-n25A         | CA_n5A-n25A                                                    | n5      | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n25     | 5, 10, 15, 20, 25, 30, 40                                                                                   |                           |
| CA_n5A-n25(2A)      | CA_n5A-n25A                                                    | n5      | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n25     | CA_n25(2A)_BCS0                                                                                             |                           |
| CA_n5A-n28A         | -                                                              | n5      | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n28     | 5, 10, 15, 20, 30                                                                                           |                           |
| CA_n5A-n29A         | -                                                              | n5      | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n29     | 5, 10                                                                                                       |                           |
| CA_n5A-n30A         | CA_n5A-n30A                                                    | n5      | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n30     | 5, 10                                                                                                       |                           |
| CA_n5A-n40A         | CA_n5A-n40A                                                    | n5      | 5, 10, 15, 20, 25 <sup>1</sup>                                                                              | 0                         |
|                     |                                                                | n40     | 5 <sup>5</sup> , 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                            |                           |
| CA_n5A-n48A         | CA_n5A-n48A                                                    | n5      | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n48     | 5, 10, 15, 20, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> |                           |
| CA_n5A-n48(2A)      | CA_n5A-n48A                                                    | n5      | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n48     | CA_n48(2A)_BCS0                                                                                             |                           |
| CA_n5A-n48B         | CA_n5A-n48A                                                    | n5      | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n48     | CA_n48B_BCS0                                                                                                |                           |
| CA_n5A-n48C         | CA_n5A-n48A                                                    | n5      | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n48     | CA_n48C_BCS0                                                                                                |                           |
| CA_n5A-n48(A-B)     | CA_n5A-n48A                                                    | n5      | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n48     | CA_n48(A-B)_BCS0                                                                                            |                           |
|                     |                                                                | n5      | 5, 10, 15, 20                                                                                               |                           |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
|                     |                                                                | n48     | CA n48(A-B) BCS1                                |                           |
| CA_n5A-n66A         | CA_n5A-n66A                                                    | n5      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 40                               |                           |
|                     |                                                                | n5      | 5, 10, 15, 20                                   | 1                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
| CA_n5B-n66A         | CA_n5A-n66A<br>CA_n5B                                          | n5      | CA_n5B_BCS0                                     | 0                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
| CA_n5A-n66(2A)      | CA_n5A-n66A                                                    | n5      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n66     | CA_n66(2A) BCS0                                 |                           |
|                     |                                                                | n5      | 5, 10, 15, 20                                   | 1                         |
|                     |                                                                | n66     | CA_n66(2A) BCS1                                 |                           |
| CA_n5A-n66(3A)      | CA_n5A-n66A                                                    | n5      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n66     | CA_n66(3A) BCS0                                 |                           |
| CA_n5B-n66(2A)      | CA_n5A-n66A<br>CA_n5B                                          | n5      | CA_n5B_BCS0                                     | 0                         |
|                     |                                                                | n66     | CA_n66(2A) BCS1                                 |                           |
| CA_n5A-n77A         | n77 <sup>8,9</sup><br>CA_n5A-n77A <sup>8</sup>                 | n5      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n5A-n77(2A)      | n77 <sup>8</sup><br>CA_n5A-n77A <sup>8</sup><br>CA_n77(2A)     | n5      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n77     | CA_n77(2A) BCS0                                 |                           |
|                     |                                                                | n5      | 5, 10, 15, 20                                   | 1                         |
|                     |                                                                | n77     | CA_n77(2A) BCS1                                 |                           |
| CA_n5(2A)-n77A      | n77 <sup>8</sup><br>CA_n5A-n77A <sup>8</sup>                   | n5      | CA_n5(2A) BCS0                                  | 0                         |
|                     |                                                                | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n5A-n77C         | n77 <sup>8</sup><br>CA_n5A-n77A <sup>8</sup>                   | n5      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n77     | CA_n77C BCS0                                    |                           |
|                     |                                                                | n5      | 5, 10, 15, 20                                   | 1                         |
|                     |                                                                | n77     | CA_n77C BCS1                                    |                           |
| CA_n5(2A)-n77C      | n77 <sup>8</sup><br>CA_n5A-n77A <sup>8</sup>                   | n5      | CA_n5(2A) BCS0                                  | 0                         |
|                     |                                                                | n77     | CA_n77C BCS0                                    |                           |
|                     |                                                                | n5      | CA_n5(2A) BCS0                                  | 1                         |
|                     |                                                                | n77     | CA_n77C BCS1                                    |                           |
| CA_n5B-n77A         | n77 <sup>8</sup><br>CA_n5A-n77A <sup>8</sup><br>CA_n5B         | n5      | CA_n5B_BCS0                                     | 0                         |
|                     |                                                                | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n5B-n77C         | n77 <sup>8</sup><br>CA_n5A-n77A <sup>8</sup><br>CA_n5B         | n5      | CA_n5B_BCS0                                     | 0                         |
|                     |                                                                | n77     | CA_n77C BCS0                                    |                           |
|                     |                                                                | n5      | CA_n5B_BCS0                                     | 1                         |
|                     |                                                                | n77     | CA_n77C BCS1                                    |                           |
| CA_n5A-n78A         | n78 <sup>8</sup><br>CA_n5A-n78A <sup>8</sup>                   | n5      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100             |                           |
|                     |                                                                | n5      | 5, 10, 15, 20                                   | 1                         |
|                     |                                                                | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n5A-n78(2A)      | CA_n5A-n78A                                                    | n5      | 5, 10, 15, 20                                   | 0                         |
| CA_n5A-n78C         | CA_n5A-n78A                                                    | n5      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n78     | CA_n78(2A) BCS2                                 |                           |
|                     |                                                                | n5      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n78     | CA_n78C BCS0                                    |                           |
|                     |                                                                | n5      | 5, 10, 15, 20                                   | 1                         |
|                     |                                                                | n78     | CA_n78C BCS1                                    |                           |
|                     |                                                                | n78     | CA_n78C BCS1                                    |                           |
| CA_n5A-n79A         | CA_n5A-n79A                                                    | n5      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n79     | 40, 50, 60, 80, 100                             |                           |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3) | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|----------------------------------|---------------------------|
| CA_n5A-n79C         | CA_n5A-n79A                                                    | n5      | 5, 10, 15, 20                    | 0                         |
|                     |                                                                | n79     | CA_n79C_BCS0                     |                           |

**Table 5.5A.3.1-1e: NR CA configurations and bandwidth combinations sets defined for inter-band CA (two bands)**

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                   | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|----------------------------------------------------|---------------------------|
| CA_n7A-n8A          | -                                                              | n7      | 5, 10, 15, 20, 25, 30, 40, 50                      | 0                         |
|                     |                                                                | n8      | 5, 10, 15, 20                                      |                           |
| CA_n7A-n25A         | CA_n7A-n25A                                                    | n7      | 5, 10, 15, 20, 25, 30, 40                          | 0                         |
|                     |                                                                | n25     | 5, 10, 15, 20, 25, 30, 40                          |                           |
| CA_n7A-n25(2A)      | CA_n7A-n25A                                                    | n7      | 5, 10, 15, 20, 25, 30, 40                          | 0                         |
|                     |                                                                | n25     | CA_n25(2A)_BCS0                                    |                           |
| CA_n7(2A)-n25A      | CA_n7A-n25A                                                    | n7      | CA_n7(2A)_BCS0                                     | 0                         |
|                     |                                                                | n25     | 5, 10, 15, 20, 25, 30, 40                          |                           |
| CA_n7(2A)-n25(2A)   | CA_n7A-n25A                                                    | n7      | CA_n7(2A)_BCS0                                     | 0                         |
|                     |                                                                | n25     | CA_n25(2A)_BCS0                                    |                           |
| CA_n7A-n28A         | CA_n7A-n28A                                                    | n7      | 5, 10, 15, 20, 25, 30, 40, 50                      | 0                         |
|                     |                                                                | n28     | 5, 10, 15, 20                                      |                           |
| CA_n7B-n28A         | CA_n7A-n28A<br>CA_n7B                                          | n7      | CA_n7B_BCS0                                        | 0                         |
|                     |                                                                | n28     | 5, 10, 15, 20                                      |                           |
| CA_n7A-n40A         | CA_n7A-n40A                                                    | n7      | 5, 10, 15, 20, 25, 30, 40, 50                      | 0                         |
|                     |                                                                | n40     | 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n7A-n46A         | CA_n7A-n46A                                                    | n7      | 5, 10, 15, 20, 25, 30, 40, 50                      | 0                         |
|                     |                                                                | n46     | 20, 40, 60, 80                                     |                           |
| CA_n7A-n46C         | CA_n7A-n46A                                                    | n7      | 5, 10, 15, 20, 25, 30, 40, 50                      | 0                         |
|                     |                                                                | n46     | CA_n46C_BCS0                                       |                           |
| CA_n7A-n46D         | CA_n7A-n46A                                                    | n7      | 5, 10, 15, 20, 25, 30, 40, 50                      | 0                         |
|                     |                                                                | n46     | CA_n46D_BCS0                                       |                           |
| CA_n7A-n66A         | CA_n7A-n66A                                                    | n7      | 5, 10, 15, 20                                      | 0                         |
|                     |                                                                | n66     | 10, 15, 20, 40                                     |                           |
|                     |                                                                | n7      | 5, 10, 15, 20, 25, 30, 40                          | 1                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40                          |                           |
| CA_n7A-n66(2A)      | CA_n7A-n66A                                                    | n7      | 5, 10, 15, 20, 25, 30, 40                          | 0                         |
|                     |                                                                | n66     | CA_n66(2A)_BCS1                                    |                           |
| CA_n7(2A)-n66A      | CA_n7A-n66A                                                    | n7      | CA_n7(2A)_BCS0                                     | 0                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40                          |                           |
| CA_n7(2A)-n66(2A)   | CA_n7A-n66A                                                    | n7      | CA_n7(2A)_BCS0                                     | 0                         |
|                     |                                                                | n66     | CA_n66(2A)_BCS1                                    |                           |
| CA_n7A-n77A         | CA_n7A-n77A                                                    | n7      | 5, 10, 15, 20, 25, 30, 40, 50                      | 0                         |
|                     |                                                                | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100    |                           |
| CA_n7(2A)-n77A      | CA_n7A-n77A                                                    | n7      | CA_n7(2A)_BCS0                                     | 0                         |
|                     |                                                                | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100    |                           |
| CA_n7A-n77(2A)      | CA_n7A-n77A                                                    | n7      | 5, 10, 15, 20, 25, 30, 40, 50                      | 0                         |
|                     |                                                                | n77     | CA_n77(2A)_BCS1                                    |                           |
| CA_n7(2A)-n77(2A)   | CA_n7A-n77A                                                    | n7      | CA_n7(2A)_BCS0                                     | 0                         |
|                     |                                                                | n77     | CA_n77(2A)_BCS1                                    |                           |
| CA_n7A-n78A         | n78 <sup>8</sup><br>CA_n7A-n78A <sup>8</sup>                   | n7      | 5, 10, 15, 20                                      | 0                         |
|                     |                                                                | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100                |                           |
|                     |                                                                | n7      | 5, 10, 15, 20, 25, 30, 40, 50                      | 1                         |
|                     |                                                                | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100    |                           |
| CA_n7B-n78A         | n78 <sup>8</sup><br>CA_n7A-n78A <sup>8</sup><br>CA_n7B         | n7      | CA_n7B_BCS0                                        | 0                         |
|                     |                                                                | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100    |                           |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
| CA_n7A-n78(2A)      | CA_n7A-n78A                                                    | n7      | 5, 10, 15, 20, 25, 30, 40, 50                   | 0                         |
|                     |                                                                | n78     | CA_n78(2A)_BCS0                                 |                           |
|                     |                                                                | n7      | 5, 10, 15, 20, 25, 30, 40, 50                   | 1                         |
|                     |                                                                | n78     | CA_n78(2A)_BCS2                                 |                           |
| CA_n7(2A)-n78A      | CA_n7A-n78A                                                    | n7      | CA_n7(2A)_BCS0                                  | 0                         |
|                     |                                                                | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100             | 1                         |
|                     |                                                                | n7      | CA_n7(2A)_BCS0                                  |                           |
|                     |                                                                | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n7(2A)-n78(2A)   | CA_n7A-n78A                                                    | n7      | CA_n7(2A)_BCS0                                  | 0                         |
|                     |                                                                | n78     | CA_n78(2A)_BCS0                                 | 1                         |
|                     |                                                                | n7      | CA_n7(2A)_BCS0                                  |                           |
|                     |                                                                | n78     | CA_n78(2A)_BCS2                                 |                           |
| CA_n7A-n79A         | -                                                              | n7      | 5, 10, 15, 20, 25, 30, 40, 50                   | 0                         |
|                     |                                                                | n79     | 40, 50, 60, 80, 100                             |                           |
| CA_n7A-n79C         | -                                                              | n7      | 5, 10, 15, 20, 25, 30, 40, 50                   | 0                         |
|                     |                                                                | n79     | CA_n79C_BCS0                                    |                           |
| CA_n8A-n20A         | -                                                              | n8      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n20     | 5, 10, 15, 20                                   |                           |
| CA_n8A-n28A         | -                                                              | n8      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n28     | 5, 10, 15, 20, 30                               |                           |
| CA_n8A-n34A         | CA_n8A-n34A                                                    | n8      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n34     | 5, 10, 15                                       |                           |
| CA_n8A-n38A         | -                                                              | n8      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n38     | 5, 10, 15, 20, 25, 30, 40                       |                           |
| CA_n8A-n39A         | CA_n8A-n39A                                                    | n8      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n39     | 5, 10, 15, 20, 25, 30, 40                       |                           |
| CA_n8A-n40A         | CA_n8A-n40A                                                    | n8      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n40     | 5, 10, 15, 20, 25, 30, 40, 50, 60, 80           |                           |
| CA_n8A-n41A         | CA_n8A-n41A                                                    | n8      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n41     | 10, 15, 20, 40, 50, 60, 80, 90, 100             |                           |
|                     |                                                                | n8      | 5, 10, 15, 20                                   | 1                         |
|                     |                                                                | n41     | 10, 15, 20, 40, 50, 60                          |                           |
| CA_n8A-n75A         | -                                                              | n8      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n75     | 5, 10, 15, 20                                   |                           |
| CA_n8A-n77A         | -                                                              | n8      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n8A-n77(2A)      | -                                                              | n8      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n77     | CA_n77(2A)_BCS1                                 |                           |
| CA_n8A-n78A         | CA_n8A-n78A                                                    | n8      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100             |                           |
|                     |                                                                | n8      | 5, 10, 15, 20                                   | 1                         |
|                     |                                                                | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100     |                           |
| CA_n8A-n78(2A)      | CA_n8A-n78A                                                    | n8      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n78     | CA_n78(2A)_BCS1                                 |                           |
| CA_n8A-n79A         | CA_n8A-n79A                                                    | n8      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n79     | 10, 20, 40, 50, 60, 80, 100                     |                           |

**Table 5.5A.3.1-1f: NR CA configurations and bandwidth combinations sets defined for inter-band CA (two bands)**

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3) | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|----------------------------------|---------------------------|
| CA_n12A-n25A        | -                                                              | n12     | 5, 10, 15                        | 0                         |
|                     |                                                                | n25     | 5, 10, 15, 20, 25, 30, 40        |                           |
| CA_n12A-n30A        | CA_n12A-n30A                                                   | n12     | 5, 10, 15                        | 0                         |
|                     |                                                                | n30     | 5, 10                            |                           |
| CA_n12A-n48A        | -                                                              | n12     | 5, 10, 15                        | 0                         |
|                     |                                                                | n48     | 10, 15, 20, 30, 40               |                           |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
| CA_n12A-n66A        | CA_n12A-n66A                                                   | n12     | 5, 10, 15                                       | 0                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 40                               |                           |
| CA_n12A-n66(2A)     | CA_n12A-n66A                                                   | n12     | 5, 10, 15                                       | 0                         |
|                     |                                                                | n66     | CA_n66(2A)_BCS1                                 |                           |
| CA_n12A-n66(3A)     | CA_n12A-n66A                                                   | n12     | 5, 10, 15                                       | 0                         |
|                     |                                                                | n66     | CA_n66(3A)_BCS0                                 |                           |
| CA_n12A-n71A        | -                                                              | n12     | 5, 10, 15                                       | 0                         |
|                     |                                                                | n71     | 5, 10, 15, 20                                   |                           |
| CA_n12A-n77A        | n77 <sup>8,9</sup><br>CA_n12A-n77A <sup>8</sup>                | n12     | 5, 10, 15                                       | 0                         |
|                     |                                                                | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n12A-n77(2A)     | n77 <sup>8,9</sup><br>CA_n12A-n77A <sup>8</sup>                | n12     | 5, 10, 15                                       | 0                         |
|                     |                                                                | n77     | CA_n77(2A)_BCS1                                 |                           |
| CA_n13A-n25A        | CA_n13A-n25A                                                   | n13     | 5, 10                                           | 0                         |
|                     |                                                                | n25     | 5, 10, 15, 20, 25, 30, 40                       |                           |
| CA_n13A-n66A        | CA_n13A-n66A                                                   | n13     | 5, 10                                           | 0                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 40                               |                           |
|                     |                                                                | n13     | 5, 10,                                          | 1                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
| CA_n13A-n77A        | n77 <sup>8,9</sup><br>CA_n13A-n77A <sup>8</sup>                | n13     | 5, 10                                           | 0                         |
|                     |                                                                | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n14A-n30A        | CA_n14A-n30A                                                   | n14     | 5, 10                                           | 0                         |
|                     |                                                                | n30     | 5, 10                                           |                           |
| CA_n14A-n66A        | CA_n14A-n66A                                                   | n14     | 5, 10                                           | 0                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
| CA_n14A-n66(2A)     | CA_n14A-n66A                                                   | n14     | 5, 10                                           | 0                         |
|                     |                                                                | n66     | CA_n66(2A)_BCS1                                 |                           |
| CA_n14A-n66(3A)     | CA_n14A-n66A                                                   | n14     | 5, 10                                           | 0                         |
|                     |                                                                | n66     | CA_n66(3A)_BCS0                                 |                           |
| CA_n14A-n77A        | n77 <sup>8,9</sup><br>CA_n14A-n77A <sup>8</sup>                | n14     | 5, 10                                           | 0                         |
|                     |                                                                | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n14A-n77(2A)     | n77 <sup>8,9</sup><br>CA_n14A-n77A <sup>8</sup>                | n14     | 5, 10                                           | 0                         |
|                     |                                                                | n77     | CA_n77(2A)_BCS1                                 |                           |
| CA_n18A-n28A        | CA_n18A-n28A                                                   | n18     | 5, 10, 15                                       | 0                         |
|                     |                                                                | n28     | 5, 10                                           |                           |
| CA_n18A-n41A        | CA_n18A-n41A                                                   | n18     | 5, 10, 15                                       | 0                         |
|                     |                                                                | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100         |                           |
| CA_n18A-n74A        | CA_n18A-n74A                                                   | n18     | 5, 10, 15                                       | 0                         |
|                     |                                                                | n74     | 5, 10, 15, 20                                   |                           |
| CA_n18A-n77A        | CA_n18A-n77A                                                   | n18     | 5, 10, 15                                       | 0                         |
|                     |                                                                | n77     | 10, 15, 20, 40, 50, 60, 80, 90, 100             |                           |
| CA_n18A-n77(2A)     | CA_n18A-n77A                                                   | n18     | 5, 10, 15                                       | 0                         |
|                     |                                                                | n77     | CA_n77(2A)_BCS0                                 |                           |
| CA_n18A-n77(3A)     | CA_n18A-n77A                                                   | n18     | 5, 10, 15                                       | 0                         |
|                     |                                                                | n77     | CA_n77(3A)_BCS1                                 |                           |
| CA_n18A-n78A        | CA_n18A-n78A                                                   | n18     | 5, 10, 15                                       | 0                         |
|                     |                                                                | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100             |                           |
| CA_n18A-n78(2A)     | CA_n18A-n78A                                                   | n18     | 5, 10, 15                                       | 0                         |
|                     |                                                                | n78     | CA_n78(2A)_BCS2                                 |                           |

**Table 5.5A.3.1-1g: NR CA configurations and bandwidth combinations sets defined for inter-band CA (two bands)**

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                                                                            | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|-------------------------------------------------------------------------------------------------------------|---------------------------|
| CA_n20A-n28A        | CA_n20A-n28A                                                   | n20     | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n28     | 5, 10, 15, 20                                                                                               |                           |
|                     |                                                                | n20     | 5, 10, 15, 20                                                                                               | 1                         |
|                     |                                                                | n28     | 5, 10, 15, 20, 30                                                                                           |                           |
| CA_n20A-n40A        | -                                                              | n20     | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n40     | 5, 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100                                                              |                           |
| CA_n20A-n67A        | -                                                              | n20     | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n67     | 5, 10, 15, 20                                                                                               |                           |
| CA_n20A-n75A        | -                                                              | n20     | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n75     | 5, 10, 15, 20                                                                                               |                           |
| CA_n20A-n78A        | CA_n20A-n78A                                                   | n20     | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100                                                                         |                           |
| CA_n24A-n41A        | CA_n24A-n41A                                                   | n24     | 5, 10                                                                                                       | 0                         |
|                     |                                                                | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100                                                                     |                           |
| CA_n24A-n41(2A)     | CA_n24A-n41A                                                   | n24     | 5, 10                                                                                                       | 0                         |
|                     |                                                                | n41     | CA_n41(2A)_BCS1                                                                                             |                           |
| CA_n24A-n48A        | CA_n24A-n48A                                                   | n24     | 5, 10                                                                                                       | 0                         |
|                     |                                                                | n48     | 5, 10, 15, 20, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> |                           |
| CA_n24A-n48B        | CA_n24A-n48A                                                   | n24     | 5, 10                                                                                                       | 0                         |
|                     |                                                                | n48     | CA_n48B_BCS1                                                                                                |                           |
| CA_n24A-n48(2A)     | CA_n24A-n48A                                                   | n24     | 5, 10                                                                                                       | 0                         |
|                     |                                                                | n48     | CA_n48(2A)_BCS0                                                                                             |                           |
| CA_n24A-n48(3A)     | CA_n24A-n48A                                                   | n24     | 5, 10                                                                                                       | 0                         |
|                     |                                                                | n48     | CA_n48(3A)_BCS0                                                                                             |                           |
| CA_n24A-n77A        | CA_n24A-n77A                                                   | n24     | 5, 10                                                                                                       | 0                         |
|                     |                                                                | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                             |                           |
| CA_n24A-n77C        | CA_n24A-n77A                                                   | n24     | 5, 10                                                                                                       | 0                         |
|                     |                                                                | n77     | CA_n77C_BCS1                                                                                                |                           |
| CA_n24A-n77(2A)     | CA_n24A-n77A                                                   | n24     | 5, 10                                                                                                       | 0                         |
|                     |                                                                | n77     | CA_n77(2A)_BCS0                                                                                             |                           |
| CA_n25A-n29A        | -                                                              | n25     | 5, 10, 15, 20, 25, 30, 40                                                                                   | 0                         |
|                     |                                                                | n29     | 5, 10                                                                                                       |                           |
| CA_n25A-n38A        | CA_n25A-n38A                                                   | n25     | 5, 10, 15, 20, 25, 30, 40                                                                                   | 0                         |
|                     |                                                                | n38     | 5, 10, 15, 20, 25, 30, 40                                                                                   |                           |
| CA_n25(2A)-n38A     | CA_n25A-n38A                                                   | n25     | CA_n25(2A)_BCS0                                                                                             | 0                         |
|                     |                                                                | n38     | 5, 10, 15, 20, 25, 30, 40                                                                                   |                           |
| CA_n25A-n41A        | n41 <sup>8,9</sup><br>CA_n25A-n41A <sup>8</sup>                | n25     | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n41     | 10, 15, 20, 40, 50, 60, 80, 90, 100                                                                         |                           |
|                     |                                                                | n25     | 5, 10, 15, 20, 25, 30, 40                                                                                   | 1                         |
|                     |                                                                | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100                                                                 |                           |
|                     |                                                                | n25     | See n25 channel bandwidths in Table 5.3.5-1                                                                 | 4 and 5                   |
|                     |                                                                | n41     | See n41 channel bandwidths in Table 5.3.5-1                                                                 |                           |
| CA_n25(2A)-n41A     | n41 <sup>8,9</sup><br>CA_n25A-n41A <sup>8</sup>                | n25     | CA_n25(2A)_BCS0                                                                                             | 0                         |
|                     |                                                                | n41     | 10, 15, 20, 40, 50, 60, 80, 90, 100                                                                         |                           |
|                     |                                                                | n25     | CA_n25(2A)_BCS1                                                                                             | 1                         |
|                     |                                                                | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100                                                                 |                           |
|                     |                                                                | n25     | CA_n25(2A)_BCS 4 and 5                                                                                      | 4 and 5                   |
|                     |                                                                | n41     | See n41 channel bandwidths in Table 5.3.5-1                                                                 |                           |
| CA_n25(2A)-n41C     | n41 <sup>8,9</sup><br>CA_n25A-n41A <sup>8</sup><br>CA_n41C     | n25     | CA_n25(2A)_BCS1                                                                                             | 0                         |
|                     |                                                                | n41     | CA_n41C_BCS2                                                                                                |                           |
|                     |                                                                | n25     | CA_n25(2A)_BCS 4 and 5                                                                                      | 4 and 5                   |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                                                                            | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|-------------------------------------------------------------------------------------------------------------|---------------------------|
|                     |                                                                | n41     | CA_n41C_BCS 4 and 5                                                                                         |                           |
| CA_n25(2A)-n41(2A)  | n41 <sup>8,9</sup><br>CA_n25A-n41A <sup>8</sup>                | n25     | CA_n25(2A)_BCS1                                                                                             | 0                         |
|                     |                                                                | n41     | CA_n41(2A)_BCS3                                                                                             | 4 and 5                   |
|                     |                                                                | n25     | CA_n25(2A)_BCS 4 and 5                                                                                      |                           |
|                     |                                                                | n41     | CA_n41(2A)_BCS 4 and 5                                                                                      |                           |
|                     |                                                                |         |                                                                                                             |                           |
| CA_n25A-n41C        | n41 <sup>8,9</sup><br>CA_n25A-n41A <sup>8</sup><br>CA_n41C     | n25     | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n41     | CA_n41C_BCS0                                                                                                | 1                         |
|                     |                                                                | n25     | 5, 10, 15, 20, 25, 30, 40                                                                                   |                           |
|                     |                                                                | n41     | CA_n41C_BCS1                                                                                                | 4 and 5                   |
|                     |                                                                | n25     | n25 channel bandwidths in Table 5.3.5-1                                                                     |                           |
| CA_n25A-n41(2A)     | n41 <sup>8,9</sup><br>CA_n25A-n41A <sup>8</sup>                | n25     | 5, 10, 15, 20                                                                                               | 0                         |
|                     |                                                                | n41     | CA_n41(2A)_BCS1                                                                                             | 1                         |
|                     |                                                                | n25     | 5, 10, 15, 20, 25, 30, 40                                                                                   |                           |
|                     |                                                                | n41     | CA_n41(2A)_BCS3                                                                                             | 4 and 5                   |
|                     |                                                                | n25     | n25 channel bandwidths in Table 5.3.5-1                                                                     |                           |
| CA_n25A-n41(3A)     | n41 <sup>8,9</sup><br>CA_n25A-n41A <sup>8</sup>                | n25     | 5, 10, 15, 20, 25, 30, 40                                                                                   | 0                         |
|                     |                                                                | n41     | CA_n41(3A)_BCS0                                                                                             | 4 and 5                   |
|                     |                                                                | n25     | n25 channel bandwidths in Table 5.3.5-1                                                                     |                           |
|                     |                                                                | n41     | CA_n41(3A)_BCS 4 and 5                                                                                      |                           |
|                     |                                                                |         |                                                                                                             |                           |
| CA_n25A-n41(A-C)    | n41 <sup>8,9</sup><br>CA_n25A-n41A <sup>8</sup>                | n25     | 5, 10, 15, 20, 25, 30, 40                                                                                   | 0                         |
|                     |                                                                | n41     | CA_n41(A-C)_BCS0                                                                                            | 4 and 5                   |
|                     |                                                                | n25     | n25 channel bandwidths in Table 5.3.5-1                                                                     |                           |
|                     |                                                                | n41     | CA_n41(A-C)_BCS 4 and 5                                                                                     |                           |
| CA_n25A-n46A        | -                                                              | n25     | 5, 10, 15, 20                                                                                               | 0                         |
| CA_n25A-n48A        | CA_n25A-n48A                                                   | n46     | 20, 40, 60, 80                                                                                              | 0                         |
|                     |                                                                | n25     | 5, 10, 15, 20                                                                                               |                           |
|                     |                                                                | n48     | 5, 10, 15, 20, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> | 1                         |
|                     |                                                                | n25     | 5, 10, 15, 20, 25, 30, 40                                                                                   |                           |
| CA_n25A-n48(2A)     | CA_n25A-n48A                                                   | n48     | 5, 10, 15, 20, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> | 0                         |
|                     |                                                                | n25     | 5, 10, 15, 20                                                                                               |                           |
|                     |                                                                | n48     | CA_n48(2A)_BCS0                                                                                             | 1                         |
|                     |                                                                | n25     | 5, 10, 15, 20, 25, 30, 40                                                                                   |                           |
| CA_n25A-n48C        | CA_n25A-n48A                                                   | n48     | CA_n48(2A)_BCS0                                                                                             | 0                         |
|                     |                                                                | n25     | 5, 10, 15, 20                                                                                               |                           |
|                     |                                                                | n48     | CA_n48C_BCS0                                                                                                | 1                         |
|                     |                                                                | n25     | 5, 10, 15, 20, 25, 30, 40                                                                                   |                           |
| CA_n25A-n66A        | CA_n25A-n66A                                                   | n48     | CA_n48C_BCS0                                                                                                | 0                         |
|                     |                                                                | n25     | 5, 10, 15, 20, 25, 30, 40                                                                                   |                           |
|                     |                                                                | n66     | 5, 10, 15, 20, 30, 40                                                                                       | 1                         |
|                     |                                                                | n25     | 5, 10, 15, 20, 25, 30, 40                                                                                   |                           |
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                   | 4 and 5                   |
|                     |                                                                | n25     | n25 channel bandwidths in Table 5.3.5-1                                                                     |                           |
| CA_n25A-n66(2A)     | CA_n25A-n66A                                                   | n66     | n66 channel bandwidths in Table 5.3.5-1                                                                     | 0                         |
|                     |                                                                | n25     | 5, 10, 15, 20, 25, 30, 40                                                                                   |                           |
|                     |                                                                | n66     | CA_n66(2A)_BCS0                                                                                             | 1                         |
|                     |                                                                | n25     | 5, 10, 15, 20, 25, 30, 40                                                                                   |                           |
|                     |                                                                | n66     | CA_n66(2A)_BCS1                                                                                             | 4 and 5                   |
|                     |                                                                | n25     | n25 channel bandwidths in Table 5.3.5-1                                                                     |                           |
| CA_n25(2A)-n66A     | CA_n25A-n66A                                                   | n66     | CA_n66(2A)_BCS 4 and 5                                                                                      | 0                         |
|                     |                                                                | n25     | CA_n25(2A)_BCS0                                                                                             |                           |
|                     |                                                                | n66     | 10, 15, 20, 30, 40                                                                                          | 1                         |
|                     |                                                                | n25     | CA_n25(2A)_BCS0                                                                                             |                           |
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                   | 2                         |
|                     |                                                                | n25     | CA_n25(2A)_BCS1                                                                                             |                           |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
| CA_n25(2A)-n66(2A)  | CA_n25A-n66A                                                   | n25     | CA_n25(2A) BCS 4 and 5                          | 4 and 5                   |
|                     |                                                                | n66     | n66 channel bandwidths in Table 5.3.5-1         |                           |
|                     |                                                                | n25     | CA_n25(2A) BCS0                                 |                           |
| CA_n25(2A)-n66(2A)  | CA_n25A-n66A                                                   | n66     | CA_n66(2A) BCS0                                 | 0                         |
|                     |                                                                | n25     | CA_n25(2A) BCS0                                 |                           |
|                     |                                                                | n66     | CA_n66(2A) BCS1                                 |                           |
|                     |                                                                | n25     | CA_n25(2A) BCS1                                 | 2                         |
|                     |                                                                | n66     | CA_n66(2A) BCS1                                 |                           |
|                     |                                                                | n25     | CA_n25(2A) BCS 4 and 5                          |                           |
|                     |                                                                | n66     | CA_n66(2A) BCS 4 and 5                          | 4 and 5                   |
|                     |                                                                | n25     | CA_n25(2A) BCS 4 and 5                          |                           |
|                     |                                                                | n66     | CA_n66(2A) BCS 4 and 5                          |                           |
| CA_n25A-n71A        | CA_n25A-n71A                                                   | n25     | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n71     | 5, 10, 15, 20                                   |                           |
|                     |                                                                | n25     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                     |                                                                | n71     | 5, 10, 15, 20                                   | 1                         |
|                     |                                                                | n25     | n25 channel bandwidths in Table 5.3.5-1         |                           |
|                     |                                                                | n71     | n71 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n25A-n71B        | CA_n25A-n71A                                                   | n25     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                     |                                                                | n71     | CA_n71B BCS0                                    |                           |
|                     |                                                                | n25     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                     |                                                                | n71     | CA_n71B BCS2                                    | 1                         |
|                     |                                                                | n25     | n25 channel bandwidths in Table 5.3.5-1         |                           |
|                     |                                                                | n71     | CA_n71B BCS 4 and 5                             |                           |
| CA_n25A-n71(2A)     | CA_n25A-n71A                                                   | n25     | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n71     | CA_n71(2A) BCS0                                 |                           |
|                     |                                                                | n25     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                     |                                                                | n71     | CA_n71(2A) BCS0                                 | 1                         |
|                     |                                                                | n25     | n25 channel bandwidths in Table 5.3.5-1         |                           |
|                     |                                                                | n71     | CA_n71(2A) BCS 4 and 5                          |                           |
| CA_n25(2A)-n71A     | CA_n25A-n71A                                                   | n25     | CA_n25(2A) BCS1                                 | 0                         |
|                     |                                                                | n71     | 5, 10, 15, 20                                   |                           |
|                     |                                                                | n25     | CA_n25(2A) BCS 4 and 5                          | 4 and 5                   |
|                     |                                                                | n71     | n71 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n25(2A)-n71(2A)  | CA_n25A-n71A                                                   | n25     | CA_n25(2A) BCS1                                 | 0                         |
|                     |                                                                | n71     | CA_n71(2A) BCS0                                 |                           |
|                     |                                                                | n25     | CA_n25(2A) BCS 4 and 5                          | 4 and 5                   |
|                     |                                                                | n71     | CA_n71(2A) BCS 4 and 5                          |                           |
| CA_n25(2A)-n71B     | CA_n25A-n71A                                                   | n25     | CA_n25(2A) BCS1                                 | 0                         |
|                     |                                                                | n71     | CA_n71B BCS2                                    |                           |
|                     |                                                                | n25     | CA_n25(2A) BCS 4 and 5                          | 4 and 5                   |
|                     |                                                                | n71     | CA_n71B BCS 4 and 5                             |                           |
| CA_n25A-n77A        | n77 <sup>8,9</sup><br>CA_n25A-n77A <sup>8</sup>                | n25     | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                     |                                                                | n25     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                     |                                                                | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 1                         |
|                     |                                                                | n25     | n25 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n25A-n77(2A)     | n77 <sup>8,9</sup><br>CA_n25A-n77A <sup>8</sup>                | n25     | n25 channel bandwidths in Table 5.3.5-1         | 4 and 5                   |
|                     |                                                                | n77     | n77 channel bandwidths in Table 5.3.5-1         |                           |
|                     |                                                                | n25     | CA_n25(2A) BCS1                                 |                           |
|                     |                                                                | n77     | CA_n77(2A) BCS0                                 | 0                         |
|                     |                                                                | n25     | CA_n77(2A) BCS1                                 |                           |
| CA_n25(2A)-n77A     | n77 <sup>8,9</sup><br>CA_n25A-n77A <sup>8</sup>                | n25     | n25 channel bandwidths in Table 5.3.5-1         | 4 and 5                   |
|                     |                                                                | n77     | CA_n77(2A) BCS 4 and 5                          |                           |
|                     |                                                                | n25     | CA_n25(2A) BCS0                                 |                           |
|                     |                                                                | n77     | CA_n25(2A) BCS 4 and 5                          | 1                         |
|                     |                                                                | n25     | CA_n25(2A) BCS 4 and 5                          |                           |
| CA_n25(2A)-n77(2A)  | CA_n25A-n77A                                                   | n25     | n77 channel bandwidths in Table 5.3.5-1         | 4 and 5                   |
|                     |                                                                | n77     | CA_n77(2A) BCS1                                 |                           |



| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
|                     |                                                                | n25     | CA_n25(2A)_BCS0                                 | 1                         |
|                     |                                                                | n77     | CA_n77(2A)_BCS1                                 |                           |
|                     |                                                                | n25     | CA_n25(2A)_BCS 4 and 5                          | 4 and 5                   |
|                     |                                                                | n77     | CA_n77(2A)_BCS 4 and 5                          |                           |
| CA_n25A-n78A        | CA_n25A-n78A                                                   | n25     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                     |                                                                | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100     |                           |
|                     |                                                                | n25     | 5, 10, 15, 20, 25, 30, 40                       | 1                         |
|                     |                                                                | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n25A-n78(2A)     | CA_n25A-n78A                                                   | n25     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                     |                                                                | n78     | CA_n78(2A)_BCS0                                 |                           |
|                     |                                                                | n25     | 5, 10, 15, 20, 25, 30, 40                       | 1                         |
|                     |                                                                | n78     | CA_n78(2A)_BCS2                                 |                           |
| CA_n25(2A)-n78A     | CA_n25A-n78A                                                   | n25     | CA_n25(2A)_BCS0                                 | 0                         |
|                     |                                                                | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100     |                           |
|                     |                                                                | n25     | CA_n25(2A)_BCS0                                 | 1                         |
|                     |                                                                | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n25(2A)-n78(2A)  | CA_n25A-n78A                                                   | n25     | CA_n25(2A)_BCS0                                 | 0                         |
|                     |                                                                | n78     | CA_n78(2A)_BCS1                                 |                           |
|                     |                                                                | n25     | CA_n25(2A)_BCS0                                 | 1                         |
|                     |                                                                | n78     | CA_n78(2A)_BCS2                                 |                           |

**Table 5.5A.3.1-1h: NR CA configurations and bandwidth combinations sets defined for inter-band CA (two bands)**

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)             | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|----------------------------------------------|---------------------------|
| CA_n26A-n66A        | CA_n26A-n66A                                                   | n26     | 5, 10, 15, 20                                | 0                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40                    |                           |
| CA_n26A-n66(2A)     | CA_n26A-n66A                                                   | n26     | 5, 10, 15, 20                                | 0                         |
|                     |                                                                | n66     | CA_n66(2A)_BCS0                              |                           |
| CA_n26A-n70A        | CA_n26A-n70A                                                   | n26     | 5, 10, 15, 20                                | 0                         |
|                     |                                                                | n70     | 5, 10, 15, 20 <sup>1</sup> , 25 <sup>1</sup> |                           |
| CA_n28A-n34A        | CA_n28A-n34A                                                   | n28     | 5, 10, 15, 20, 30                            | 0                         |
|                     |                                                                | n34     | 5, 10, 15                                    |                           |
| CA_n28A-n38A        | -                                                              | n28     | 5, 10, 15, 20, 30                            | 0                         |
|                     |                                                                | n38     | 5, 10, 15, 20, 25, 30, 40                    |                           |
| CA_n28A-n39A        | CA_n28A-n39A                                                   | n28     | 5, 10, 15, 20, 30                            | 0                         |
|                     |                                                                | n39     | 5, 10, 15, 20, 25, 30, 40                    |                           |
| CA_n28A-n40A        | CA_n28A-n40A                                                   | n28     | 5, 10, 15, 20                                | 0                         |
|                     |                                                                | n40     | 5, 10, 15, 20, 25, 30, 40, 50, 60, 80        |                           |
| CA_n28A-n40B        | -                                                              | n28     | 5, 10, 15, 20                                | 0                         |
|                     |                                                                | n40     | CA_n40B_BCS0                                 |                           |
| CA_n28A-n41A        | n41 <sup>8</sup><br>CA_n28A-n41A <sup>8</sup>                  | n28     | 5, 10, 15, 20                                | 0                         |
|                     |                                                                | n41     | 10, 15, 20, 40, 50, 60, 80, 90, 100          |                           |
|                     |                                                                | n28     | 5, 10, 15, 20, 30                            | 1                         |
|                     |                                                                | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100      |                           |
| CA_n28A-n41B        | CA_n28A-n41A                                                   | n28     | 5, 10                                        | 0                         |
|                     |                                                                | n41     | CA_n41B_BCS0                                 |                           |
| CA_n28A-n41C        | CA_n28A-n41A<br>CA_n41C                                        | n28     | 5, 10, 15, 20, 30                            | 0                         |
|                     |                                                                | n41     | CA_n41C_BCS1                                 |                           |
| CA_n28A-n46A        | CA_n28A-n46A                                                   | n28     | 5, 10, 15, 20                                | 0                         |
|                     |                                                                | n46     | 20, 40, 60, 80                               |                           |
| CA_n28A-n46C        | CA_n28A-n46A                                                   | n28     | 5, 10, 15, 20                                | 0                         |
|                     |                                                                | n46     | CA_n46C_BCS0                                 |                           |
| CA_n28A-n46D        | CA_n28A-n46A                                                   | n28     | 5, 10, 15, 20                                | 0                         |
|                     |                                                                | n46     | CA_n46D_BCS0                                 |                           |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
| CA_n28A-n50A        | CA_n28A-n50A                                                   | n28     | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n50     | 5, 10, 15, 20, 40, 50, 60, 80 <sup>1</sup>      |                           |
| CA_n28A-n71A        | -                                                              | n28     | 5, 10, 15, 20, 30                               | 0                         |
|                     |                                                                | n71     | 5, 10, 15, 20                                   |                           |
| CA_n28A-n74A        | CA_n28A-n74A                                                   | n28     | 5, 10, 15, 20, 30                               | 0                         |
|                     |                                                                | n74     | 5, 10, 15, 20                                   |                           |
| CA_n28A-n75A        | -                                                              | n28     | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n75     | 5, 10, 15, 20                                   |                           |
|                     | -                                                              | n28     | 5, 10, 15, 20                                   | 1                         |
|                     |                                                                | n75     | 5, 10, 15, 20, 25, 30, 40, 50                   |                           |
| CA_n28A-n77A        | CA_n28A-n77A                                                   | n28     | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n77     | 10, 15, 20, 40, 50, 60, 80, 90, 100             |                           |
| CA_n28A-n77(2A)     | CA_n77(2A)<br>CA_n28A-n77A                                     | n28     | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n77     | CA_n77(2A) BCS0                                 |                           |
| CA_n28A-n77(3A)     | CA_n28A-n77A                                                   | n28     | 5, 10                                           | 0                         |
|                     |                                                                | n77     | CA_n77(3A) BCS0                                 |                           |
| CA_n28A-n78A        | n78 <sup>8</sup><br>CA_n28A-n78A <sup>8</sup>                  | n28     | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100             |                           |
|                     |                                                                | n28     | 5, 10, 15, 20, 30                               | 1                         |
|                     |                                                                | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n28A-n78(2A)     | CA_n78(2A)<br>CA_n28A-n78A                                     | n28     | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n78     | CA_n78(2A) BCS0                                 |                           |
|                     |                                                                | n28     | 5, 10, 15, 20                                   | 1                         |
|                     |                                                                | n78     | CA_n78(2A) BCS2                                 |                           |
| CA_n28A-n79A        | n79 <sup>8</sup><br>CA_n28A-n79A <sup>8</sup>                  | n28     | 5, 10, 15, 20, 30                               | 0                         |
|                     |                                                                | n79     | 40, 50, 60, 80, 100                             |                           |
| CA_n28A-n79C        | CA_n79C                                                        | n28     | 5, 10, 15, 20, 30                               | 0                         |
|                     |                                                                | n79     | CA_n79C BCS0                                    |                           |
| CA_n29A-n30A        | -                                                              | n29     | 5, 10                                           | 0                         |
|                     |                                                                | n30     | 5, 10                                           |                           |
| CA_n29A-n66A        | -                                                              | n29     | 5, 10                                           | 0                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 40                               |                           |
|                     |                                                                | n29     | 5, 10                                           | 1                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
| CA_n29A-n66B        | -                                                              | n29     | 5, 10                                           | 0                         |
|                     |                                                                | n66     | CA_n66B BCS0                                    |                           |
| CA_n29A-n66(2A)     | -                                                              | n29     | 5, 10                                           | 0                         |
|                     |                                                                | n66     | CA_n66(2A) BCS0                                 |                           |
|                     |                                                                | n29     | 5, 10                                           | 1                         |
|                     |                                                                | n66     | CA_n66(2A) BCS1                                 |                           |
| CA_n29A-n66(3A)     | -                                                              | n29     | 5, 10                                           | 0                         |
|                     |                                                                | n66     | CA_n66(3A) BCS0                                 |                           |
| CA_n29A-n70A        | -                                                              | n29     | 5, 10                                           | 0                         |
|                     |                                                                | n70     | 5, 10, 15, 20 <sup>1</sup> , 25 <sup>1</sup>    |                           |
| CA_n29A-n71A        | -                                                              | n29     | 5, 10                                           | 0                         |
|                     |                                                                | n71     | 5, 10, 15, 20                                   |                           |
| CA_n29A-n77A        | n77 <sup>8,9</sup>                                             | n29     | 5, 10                                           | 0                         |
|                     |                                                                | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n29A-n77(2A)     | n77 <sup>8,9</sup>                                             | n29     | 5, 10                                           | 0                         |
|                     |                                                                | n77     | CA_n77(2A) BCS1                                 |                           |

**Table 5.5A.3.1-1i: NR CA configurations and bandwidth combinations sets defined for inter-band CA (two bands)**

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
| CA_n30A-n66A        | CA_n30A-n66A                                                   | n30     | 5, 10                                           | 0                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
| CA_n30A-n66(2A)     | CA_n30A-n66A                                                   | n30     | 5, 10                                           | 0                         |
|                     |                                                                | n66     | CA_n66(2A)_BCS1                                 |                           |
| CA_n30A-n66(3A)     | CA_n30A-n66A                                                   | n30     | 5, 10                                           | 0                         |
|                     |                                                                | n66     | CA_n66(3A)_BCS0                                 |                           |
| CA_n30A-n77A        | n77 <sup>8,9</sup><br>CA_n30A-n77A <sup>8</sup>                | n30     | 5, 10                                           | 0                         |
|                     |                                                                | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n30A-n77(2A)     | n77 <sup>8,9</sup><br>CA_n77(2A)<br>CA_n30A-n77A <sup>8</sup>  | n30     | 5, 10                                           | 0                         |
|                     |                                                                | n77     | CA_n77(2A)_BCS1                                 |                           |
| CA_n34A-n40A        | CA_n34A-n40A                                                   | n34     | 5, 10, 15                                       | 0                         |
|                     |                                                                | n40     | 5, 10, 15, 20, 25, 30, 40, 50, 60, 80           |                           |
| CA_n34A-n41A        | CA_n34A-n41A                                                   | n34     | 5, 10, 15                                       | 0                         |
|                     |                                                                | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100     |                           |
| CA_n34A-n41C        | CA_n34A-n41A                                                   | n34     | 5, 10, 15                                       | 0                         |
|                     |                                                                | n41     | CA_n41C_BCS1                                    |                           |
| CA_n34A-n79A        | CA_n34A-n79A                                                   | n34     | 5, 10, 15                                       | 0                         |
|                     |                                                                | n79     | 40, 50, 60, 80, 100                             |                           |
| CA_n34A-n79C        | CA_n34A-n79A                                                   | n34     | 5, 10, 15                                       | 0                         |
|                     |                                                                | n79     | CA_n79C_BCS0                                    |                           |
| CA_n38A-n40A        | -                                                              | n38     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                     |                                                                | n40     | 5, 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100  |                           |
| CA_n38A-n66A        | CA_n38A-n66A                                                   | n38     | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 30, 40                           |                           |
|                     |                                                                | n38     | 5, 10, 15, 20, 25, 30, 40                       | 1                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
| CA_n38A-n66(2A)     | CA_n38A-n66A                                                   | n38     | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n66     | CA_n66(2A)_BCS1                                 |                           |
|                     |                                                                | n38     | 5, 10, 15, 20, 25, 30, 40                       | 1                         |
|                     |                                                                | n66     | CA_n66(2A)_BCS1                                 |                           |
| CA_n38A-n71A        | -                                                              | n38     | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n71     | 5, 10, 15, 20                                   |                           |
| CA_n38A-n78A        | CA_n38A-n78A                                                   | n38     | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100     |                           |
|                     |                                                                | n38     | 5, 10, 15, 20, 25, 30, 40                       | 1                         |
|                     |                                                                | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n38A-n78(2A)     | CA_n38A-n78A                                                   | n38     | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n78     | CA_n78(2A)_BCS0                                 |                           |
|                     |                                                                | n38     | 5, 10, 15, 20                                   | 1                         |
|                     |                                                                | n78     | CA_n78(2A)_BCS2                                 |                           |
| CA_n38A-n79A        | -                                                              | n38     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                     |                                                                | n79     | 40, 50, 60, 80, 100                             |                           |
| CA_n38A-n79C        | -                                                              | n38     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                     |                                                                | n79     | CA_n79C_BCS0                                    |                           |
| CA_n39A-n40A        | CA_n39A-n40A                                                   | n39     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                     |                                                                | n40     | 5, 10, 15, 20, 25, 30, 40, 50, 60, 80           |                           |
| CA_n39A-n41A        | CA_n39A-n41A                                                   | n39     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                     |                                                                | n41     | 10, 15, 20, 40, 50, 60, 80, 90, 100             |                           |
| CA_n39A-n41C        | CA_n39A-n41A                                                   | n39     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                     |                                                                | n41     | CA_n41C_BCS0                                    |                           |
| CA_n39A-n41(2A)     | CA_n39A-n41A                                                   | n39     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                     |                                                                | n41     | CA_n41(2A)_BCS0                                 |                           |
| CA_n39A-n79A        | CA_n39A-n79A                                                   | n39     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                                            | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|-----------------------------------------------------------------------------|---------------------------|
|                     |                                                                | n79     | 40, 50, 60, 80, 100                                                         |                           |
| CA_n40A-n41A        | n41 <sup>8</sup><br>CA_n40A-n41A <sup>8</sup>                  | n40     | 5, 10, 15, 20, 25, 30, 40, 50, 60, 80                                       | 0                         |
|                     |                                                                | n41     | 10, 15, 20, 40, 50, 60, 80, 90, 100                                         |                           |
|                     |                                                                | n40     | 5, 10, 15, 20, 25, 30, 40                                                   | 1                         |
|                     |                                                                | n41     | 10, 15, 20, 40, 50, 60                                                      |                           |
| CA_n40A-n41C        | CA_n41C<br>CA_n40A-n41A                                        | n40     | 5, 10, 15, 20, 25, 30, 40                                                   | 0                         |
|                     |                                                                | n41     | CA_n41C_BCS0                                                                |                           |
| CA_n40A-n77A        | CA_n40A-n77A                                                   | n40     | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100                                 | 0                         |
|                     |                                                                | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70 <sup>4</sup> , 80, 90 <sup>4</sup> , 100 |                           |
| CA_n40A-n77(2A)     | CA_n40A-n77A                                                   | n40     | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100                                 | 0                         |
|                     |                                                                | n77     | CA_n77(2A)_BCS1                                                             |                           |
| CA_n40A-n77C        | -                                                              | n40     | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100                                 | 0                         |
|                     |                                                                | n77     | CA_n77C_BCS1                                                                |                           |
| CA_n40B-n77A        | CA_n40A-n77A                                                   | n40     | CA_n40B_BCS1                                                                | 0                         |
|                     |                                                                | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70 <sup>4</sup> , 80, 90 <sup>4</sup> , 100 |                           |
| CA_n40B-n77(2A)     | CA_n40A-n77A                                                   | n40     | CA_n40B_BCS1                                                                | 0                         |
|                     |                                                                | n77     | CA_n77(2A)_BCS1                                                             |                           |
| CA_n40B-n77C        | CA_n40A-n77A                                                   | n40     | CA_n40B_BCS1                                                                | 0                         |
|                     |                                                                | n77     | CA_n77C_BCS1                                                                |                           |
| CA_n40A-n78A        | CA_n40A-n78A                                                   | n40     | 5, 10, 15, 20, 25, 30, 40, 50, 60, 80                                       | 0                         |
|                     |                                                                | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100                                         |                           |
|                     |                                                                | n40     | 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                          | 1                         |
|                     |                                                                | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                             |                           |
| CA_n40A-n78(2A)     | CA_n40A-n78A                                                   | n40     | 5, 10, 15, 20, 25, 30, 40, 50, 60, 80                                       | 0                         |
|                     |                                                                | n78     | CA_n78(2A)_BCS1                                                             |                           |
| CA_n40A-n78C        | CA_n40A-n78A                                                   | n40     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100                                 | 0                         |
|                     |                                                                | n78     | CA_n78C_BCS1                                                                |                           |
| CA_n40B-n78A        | -                                                              | n40     | CA_n40B_BCS0                                                                | 0                         |
|                     |                                                                | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100                                         |                           |
|                     | CA_n40A-n78A                                                   | n40     | CA_n40B_BCS1                                                                | 1                         |
|                     |                                                                | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                             |                           |
| CA_n40B-n78(2A)     | CA_n40A-n78A                                                   | n40     | CA_n40B_BCS1                                                                | 0                         |
|                     |                                                                | n78     | CA_n78(2A)_BCS2                                                             |                           |
| CA_n40B-n78C        | CA_n40A-n78A                                                   | n40     | CA_n40B_BCS1                                                                | 0                         |
|                     |                                                                | n78     | CA_n78C_BCS1                                                                |                           |
| CA_n40A-n79A        | CA_n40A-n79A                                                   | n40     | 5, 10, 15, 20, 25, 30, 40, 50, 60, 80                                       | 0                         |
|                     |                                                                | n79     | 40, 50, 60, 80, 100                                                         |                           |
|                     |                                                                | n40     | 5, 10, 15, 20, 25, 30, 40                                                   | 1                         |
|                     |                                                                | n79     | 40, 50, 60, 80, 100                                                         |                           |

**Table 5.5A.3.1-1j: NR CA configurations and bandwidth combinations sets defined for inter-band CA (two bands)**

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                                                                            | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|-------------------------------------------------------------------------------------------------------------|---------------------------|
| CA_n41A-n48A        | CA_n41A-n48A                                                   | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100                                                                 | 0                         |
|                     |                                                                | n48     | 5, 10, 15, 20, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> |                           |
| CA_n41A-n48B        | CA_n41A-n48A                                                   | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100                                                                 | 0                         |
|                     |                                                                | n48     | CA_n48B_BCS2                                                                                                |                           |
| CA_n41A-n48C        | CA_n41A-n48A                                                   | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100                                                                 | 0                         |
|                     |                                                                | n48     | CA_n48C_BCS1                                                                                                |                           |
| CA_n41A-n48(2A)     | CA_n41A-n48A                                                   | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100                                                                     | 0                         |
|                     |                                                                | n48     | CA_n48(2A)_BCS0                                                                                             |                           |
| CA_n41C-n48A        | CA_n41A-n48A                                                   | n41     | CA_n41C_BCS2                                                                                                | 0                         |
|                     |                                                                | n48     | 5, 10, 15, 20, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> |                           |
| CA_n41C-n48B        | CA_n41A-n48A                                                   | n41     | CA_n41C_BCS2                                                                                                | 0                         |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                                                                            | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|-------------------------------------------------------------------------------------------------------------|---------------------------|
|                     |                                                                | n48     | CA_n48B_BCS2                                                                                                |                           |
| CA_n41C-n48C        | CA_n41A-n48A                                                   | n41     | CA_n41C_BCS2                                                                                                | 0                         |
|                     |                                                                | n48     | CA_n48C_BCS1                                                                                                |                           |
| CA_n41(2A)-n48A     | CA_n41A-n48A                                                   | n41     | CA_n41(2A)_BCS3                                                                                             | 0                         |
|                     |                                                                | n48     | 5, 10, 15, 20, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> |                           |
| CA_n41(2A)-n48B     | CA_n41A-n48A                                                   | n41     | CA_n41(2A)_BCS3                                                                                             | 0                         |
|                     |                                                                | n48     | CA_n48B_BCS2                                                                                                |                           |
| CA_n41(2A)-n48C     | CA_n41A-n48A                                                   | n41     | CA_n41(2A)_BCS3                                                                                             | 0                         |
|                     |                                                                | n48     | CA_n48C_BCS1                                                                                                |                           |
| CA_n41(2A)-n48(2A)  | CA_n41A-n48A                                                   | n41     | CA_n41(2A)_BCS1                                                                                             | 0                         |
|                     |                                                                | n48     | CA_n48(2A)_BCS0                                                                                             |                           |
| CA_n41A-n50A        | CA_n41A-n50A                                                   | n41     | 10, 15, 20, 40, 50, 60, 80, 90, 100                                                                         | 0                         |
|                     |                                                                | n50     | 5, 10, 15, 20, 40, 50, 60, 80 <sup>1</sup>                                                                  |                           |
| CA_n41A-n66A        | n41 <sup>8,9</sup><br>CA_n41A-n66A <sup>8</sup>                | n41     | 10, 15, 20, 40, 50, 60, 80, 90, 100                                                                         | 0                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 40                                                                                           |                           |
|                     |                                                                | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100                                                                     | 1                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                   |                           |
|                     |                                                                | n41     | n41 channel bandwidths in Table 5.3.5-1                                                                     | 4 and 5                   |
|                     |                                                                | n66     | n66 channel bandwidths in Table 5.3.5-1                                                                     |                           |
| CA_n41(2A)-n66A     | n41 <sup>8,9</sup><br>CA_n41A-n66A <sup>8</sup>                | n41     | CA_n41(2A)_BCS1                                                                                             | 0                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 40                                                                                           |                           |
|                     |                                                                | n41     | CA_n41(2A)_BCS1                                                                                             | 1                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                   |                           |
|                     |                                                                | n41     | CA_n41(2A)_BCS 4 and 5                                                                                      | 4 and 5                   |
|                     |                                                                | n66     | n66 channel bandwidths in Table 5.3.5-1                                                                     |                           |
| CA_n41A-n66(2A)     | n41 <sup>8,9</sup><br>CA_n41A-n66A <sup>8</sup>                | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100                                                                 | 0                         |
|                     |                                                                | n66     | CA_n66(2A)_BCS1                                                                                             |                           |
|                     |                                                                | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100                                                                     | 1                         |
|                     |                                                                | n66     | CA_n66(2A)_BCS1                                                                                             |                           |
|                     |                                                                | n41     | n41 channel bandwidths in Table 5.3.5-1                                                                     | 4 and 5                   |
|                     |                                                                | n66     | CA_n66(2A)_BCS 4 and 5                                                                                      |                           |
| CA_n41C-n66A        | n41 <sup>8,9</sup><br>CA_n41A-n66A <sup>8</sup><br>CA_n41C     | n41     | CA_n41C_BCS0                                                                                                | 0                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 40                                                                                           |                           |
|                     |                                                                | n41     | CA_n41C_BCS1                                                                                                | 1                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                   |                           |
|                     |                                                                | n41     | CA_n41C_BCS 4 and 5                                                                                         | 4 and 5                   |
|                     |                                                                | n66     | n66 channel bandwidths in Table 5.3.5-1                                                                     |                           |
| CA_n41C-n66(2A)     | n41 <sup>8,9</sup><br>CA_n41A-n66A <sup>8</sup><br>CA_n41C     | n41     | CA_n41C_BCS2                                                                                                | 0                         |
|                     |                                                                | n66     | CA_n66(2A)_BCS1                                                                                             |                           |
|                     |                                                                | n41     | CA_n41C_BCS 4 and 5                                                                                         | 4 and 5                   |
|                     |                                                                | n66     | CA_n66(2A)_BCS 4 and 5                                                                                      |                           |
| CA_n41(2A)-n66(2A)  | n41 <sup>8,9</sup><br>CA_n41A-n66A <sup>8</sup>                | n41     | CA_n41(2A)_BCS3                                                                                             | 0                         |
|                     |                                                                | n66     | CA_n66(2A)_BCS1                                                                                             |                           |
|                     |                                                                | n41     | CA_n41(2A)_BCS 4 and 5                                                                                      | 4 and 5                   |
|                     |                                                                | n66     | CA_n66(2A)_BCS 4 and 5                                                                                      |                           |
| CA_n41(3A)-n66A     | n41 <sup>8,9</sup><br>CA_n41A-n66A <sup>8</sup>                | n41     | CA_n41(3A)_BCS0                                                                                             | 0                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40,                                                                                  |                           |
|                     |                                                                | n41     | CA_n41(3A)_BCS 4 and 5                                                                                      | 4 and 5                   |
|                     |                                                                | n66     | n66 channel bandwidths in Table 5.3.5-1                                                                     |                           |
| CA_n41(A-C)-n66A    | n41 <sup>8,9</sup><br>CA_n41A-n66A <sup>8</sup>                | n41     | CA_n41(A-C)_BCS0                                                                                            | 0                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                   |                           |
|                     |                                                                | n41     | CA_n41(A-C)_BCS 4 and 5                                                                                     | 4 and 5                   |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)             | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|----------------------------------------------|---------------------------|
|                     |                                                                | n66     | n66 channel bandwidths in Table 5.3.5-1      |                           |
| CA_n41A-n70A        | CA_n41A-n70A                                                   | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100  | 0                         |
|                     |                                                                | n70     | 5, 10, 15, 20 <sup>1</sup> , 25 <sup>1</sup> |                           |
| CA_n41A-n71A        | n41 <sup>8,9</sup><br>CA_n41A-n71A <sup>8</sup>                | n41     | 10, 15, 20, 40, 50, 60, 80, 90, 100          | 0                         |
|                     |                                                                | n71     | 5, 10, 15, 20                                |                           |
|                     |                                                                | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100  | 1                         |
|                     |                                                                | n71     | 5, 10, 15, 20                                |                           |
|                     |                                                                | n41     | n41 channel bandwidths in Table 5.3.5-1      | 4 and 5                   |
|                     |                                                                | n71     | n71 channel bandwidths in Table 5.3.5-1      |                           |
| CA_n41A-n71B        | n41 <sup>8,9</sup><br>CA_n41A-n71A <sup>8</sup>                | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100      | 0                         |
|                     |                                                                | n71     | CA_n71B_BCS0                                 |                           |
|                     |                                                                | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100  | 1                         |
|                     |                                                                | n71     | CA_n71B_BCS2                                 |                           |
|                     |                                                                | n41     | n41 channel bandwidths in Table 5.3.5-1      | 4 and 5                   |
|                     |                                                                | n71     | CA_n71B_BCS 4 and 5                          |                           |
| CA_n41A-n71(2A)     | n41 <sup>8,9</sup><br>CA_n41A-n71A <sup>8</sup>                | n41     | 10, 15, 20, 40, 50, 60, 80, 90, 100          | 0                         |
|                     |                                                                | n71     | CA_n71(2A)_BCS0                              |                           |
|                     |                                                                | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100  | 1                         |
|                     |                                                                | n71     | CA_n71(2A)_BCS0                              |                           |
|                     |                                                                | n41     | n41 channel bandwidths in Table 5.3.5-1      | 4 and 5                   |
|                     |                                                                | n71     | CA_n71(2A)_BCS 4 and 5                       |                           |
| CA_n41C-n71A        | n41 <sup>8,9</sup><br>CA_n41A-n71A <sup>8</sup><br>CA_n41C     | n41     | CA_n41C_BCS0                                 | 0                         |
|                     |                                                                | n71     | 5, 10, 15, 20                                |                           |
|                     |                                                                | n41     | CA_n41C_BCS1                                 | 1                         |
|                     |                                                                | n71     | 5, 10, 15, 20                                |                           |
|                     |                                                                | n41     | CA_n41C_BCS 4 and 5                          | 4 and 5                   |
|                     |                                                                | n71     | n71 channel bandwidths in Table 5.3.5-1      |                           |
| CA_n41C-n71(2A)     | n41 <sup>8,9</sup><br>CA_n41A-n71A <sup>8</sup>                | n41     | CA_n41C_BCS1                                 | 0                         |
|                     |                                                                | n71     | CA_n71(2A)_BCS0                              |                           |
|                     |                                                                | n41     | CA_n41C_BCS 4 and 5                          | 4 and 5                   |
|                     |                                                                | n71     | CA_n71(2A)_BCS 4 and 5                       |                           |
| CA_n41(2A)-n71A     | n41 <sup>8,9</sup><br>CA_n41A-n71A <sup>8</sup>                | n41     | CA_n41(2A)_BCS1                              | 0                         |
|                     |                                                                | n71     | 5, 10, 15, 20                                |                           |
|                     |                                                                | n41     | CA_n41(2A)_BCS3                              | 1                         |
|                     |                                                                | n71     | 5, 10, 15, 20                                |                           |
|                     |                                                                | n41     | CA_n41(2A)_BCS 4 and 5                       | 4 and 5                   |
|                     |                                                                | n71     | n71 channel bandwidths in Table 5.3.5-1      |                           |
| CA_n41(2A)-n71(2A)  | n41 <sup>8,9</sup><br>CA_n41A-n71A <sup>8</sup>                | n41     | CA_n41(2A)_BCS1                              | 0                         |
|                     |                                                                | n71     | CA_n71(2A)_BCS0                              |                           |
|                     |                                                                | n41     | CA_n41(2A)_BCS 4 and 5                       | 4 and 5                   |
|                     |                                                                | n71     | CA_n71(2A)_BCS 4 and 5                       |                           |
| CA_n41(2A)-n71B     | n41 <sup>8,9</sup><br>CA_n41A-n71A <sup>8</sup>                | n41     | CA_n41(2A)_BCS1                              | 0                         |
|                     |                                                                | n71     | CA_n71B_BCS0                                 |                           |
|                     |                                                                | n41     | CA_n41(2A)_BCS1                              | 1                         |
|                     |                                                                | n71     | CA_n71B_BCS2                                 |                           |
|                     |                                                                | n41     | CA_n41(2A)_BCS 4 and 5                       | 4 and 5                   |
|                     |                                                                | n71     | CA_n71B_BCS 4 and 5                          |                           |
| CA_n41(3A)-n71A     | n41 <sup>8,9</sup><br>CA_n41A-n71A <sup>8</sup>                | n41     | CA_n41(3A)_BCS0                              | 0                         |
|                     |                                                                | n71     | 5, 10, 15, 20                                |                           |
|                     |                                                                | n41     | CA_n41(3A)_BCS 4 and 5                       | 4 and 5                   |
|                     |                                                                | n71     | n71 channel bandwidths in Table 5.3.5-1      |                           |
| CA_n41(A-C)-n71A    | n41 <sup>8,9</sup>                                             | n41     | CA_n41(A-C)_BCS0                             | 0                         |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup>                   | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|---------------------|----------------------------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
|                     | CA_n41A-n71A <sup>8</sup>                                                        |         |                                                 | 4 and 5                   |
|                     |                                                                                  | n71     | 5, 10, 15, 20                                   |                           |
|                     |                                                                                  | n41     | CA_n41(A-C)_BCS 4 and 5                         |                           |
|                     |                                                                                  | n71     | n71 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n41C-n71B        | n41 <sup>8,9</sup><br>CA_n41A-n71A <sup>8</sup><br>CA_n41C                       | n41     | CA_n41C_BCS0                                    | 0                         |
|                     |                                                                                  | n71     | CA_n71B_BCS0                                    | 1                         |
|                     |                                                                                  | n41     | CA_n41C_BCS1                                    |                           |
|                     |                                                                                  | n71     | CA_n71B_BCS2                                    | 4 and 5                   |
|                     |                                                                                  | n41     | CA_n41C_BCS 4 and 5                             |                           |
| CA_n41A-n74A        | CA_n41A-n74A                                                                     | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100         | 0                         |
|                     |                                                                                  | n74     | 5, 10, 15, 20                                   |                           |
| CA_n41A-n77A        | n41 <sup>8,9</sup><br>n77 <sup>8,9</sup><br>CA_n41A-n77A <sup>8</sup>            | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100         | 0                         |
|                     |                                                                                  | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 1                         |
|                     |                                                                                  | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100     |                           |
|                     |                                                                                  | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 4 and 5                   |
|                     |                                                                                  | n41     | n41 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n41B-n77A        | CA_n41A-n77A                                                                     | n77     | n77 channel bandwidths in Table 5.3.5-1         | 0                         |
|                     |                                                                                  | n41     | CA_n41B_BCS0                                    |                           |
| CA_n41(2A)-n77A     | n41 <sup>8,9</sup><br>n77 <sup>8,9</sup><br>CA_n41A-n77A <sup>8</sup>            | n41     | CA_n41(2A)_BCS1                                 | 0                         |
|                     |                                                                                  | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 4 and 5                   |
|                     |                                                                                  | n41     | CA_n41(2A)_BCS 4 and 5                          |                           |
|                     |                                                                                  | n77     | n77 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n41(3A)-n77A     | n41 <sup>8,9</sup><br>n77 <sup>8,9</sup><br>CA_n41A-n77A <sup>8</sup>            | n41     | CA_n41(3A)_BCS0                                 | 0                         |
|                     |                                                                                  | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 4 and 5                   |
|                     |                                                                                  | n41     | CA_n41(3A)_BCS 4 and 5                          |                           |
|                     |                                                                                  | n77     | n77 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n41(A-C)-n77A    | n41 <sup>8,9</sup><br>n77 <sup>8,9</sup><br>CA_n41A-n77A <sup>8</sup>            | n41     | CA_n41(A-C)_BCS0                                | 0                         |
|                     |                                                                                  | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 4 and 5                   |
|                     |                                                                                  | n41     | CA_n41(A-C)_BCS 4 and 5                         |                           |
|                     |                                                                                  | n77     | n77 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n41C-n77A        | n41 <sup>8,9</sup><br>n77 <sup>8,9</sup><br>CA_n41A-n77A <sup>8</sup><br>CA_n41C | n41     | CA_n41C_BCS0                                    | 0                         |
|                     |                                                                                  | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 4 and 5                   |
|                     |                                                                                  | n41     | CA_n41C_BCS 4 and 5                             |                           |
|                     |                                                                                  | n77     | n77 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n41A-n77(2A)     | n41 <sup>8,9</sup><br>n77 <sup>8,9</sup><br>CA_n41A-n77A <sup>8</sup>            | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100     | 0                         |
|                     |                                                                                  | n77     | CA_n77(2A)_BCS1                                 | 4 and 5                   |
|                     |                                                                                  | n41     | n41 channel bandwidths in Table 5.3.5-1         |                           |
|                     |                                                                                  | n77     | CA_n77(2A)_BCS 4 and 5                          |                           |
| CA_n41C-n77(2A)     | n41 <sup>8,9</sup><br>n77 <sup>8,9</sup><br>CA_n41A-n77A <sup>8</sup><br>CA_n41C | n41     | CA_n41C_BCS0                                    | 0                         |
|                     |                                                                                  | n77     | CA_n77(2A)_BCS1                                 | 0                         |
| CA_n41A-n77(3A)     | CA_n41A-n77A                                                                     | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100         |                           |
|                     |                                                                                  | n77     | CA_n77(3A)_BCS0                                 |                           |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup>    | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|---------------------|-------------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
| CA_n41(2A)-n77(2A)  | -                                                                 | n41     | CA_n41(2A)_BCS1                                 | 0                         |
|                     |                                                                   | n77     | CA_n77(2A)_BCS1                                 |                           |
| CA_n41A-n77C        | CA_n41A-n77A                                                      | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100         | 0                         |
|                     |                                                                   | n77     | CA_n77C_BCS0                                    |                           |
| CA_n41A-n78A        | CA_n41A-n78A                                                      | n41     | 10, 15, 20, 40, 50, 60, 80, 100                 | 0                         |
|                     |                                                                   | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100             |                           |
|                     |                                                                   | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100         | 1                         |
|                     |                                                                   | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n41A-n78(2A)     | CA_n41A-n78A                                                      | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100         | 0                         |
|                     |                                                                   | n78     | CA_n78(2A)_BCS2                                 |                           |
| CA_n41A-n78C        | CA_n41A-n78A                                                      | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100         | 0                         |
|                     |                                                                   | n78     | CA_n78C_BCS0                                    |                           |
| CA_n41A-n79A        | n41 <sup>8</sup><br>n79 <sup>8</sup><br>CA_n41A-n79A <sup>8</sup> | n41     | 10, 15, 20, 40, 50, 60, 80, 90, 100             | 0                         |
|                     |                                                                   | n79     | 40, 50, 60, 80, 100                             |                           |
|                     |                                                                   | n41     | 10, 15, 20, 40, 50, 60                          | 1                         |
|                     |                                                                   | n79     | 40, 50, 60, 80, 100                             |                           |
|                     |                                                                   | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100         | 2                         |
|                     |                                                                   | n79     | 40, 50, 60, 80, 100                             |                           |
| CA_n41C-n79A        | CA_n41A-n79A<br>CA_n41C                                           | n41     | CA_n41C_BCS0                                    | 0                         |
|                     |                                                                   | n79     | 40, 50, 60, 80, 100                             |                           |

**Table 5.5A.3.1-1k: NR CA configurations and bandwidth combinations sets defined for inter-band CA (two bands)**

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                                                                            | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|-------------------------------------------------------------------------------------------------------------|---------------------------|
| CA_n46A-n48A        | CA_n46A-n48A                                                   | n46     | 20, 40, 60, 80                                                                                              | 0                         |
|                     |                                                                | n48     | 20                                                                                                          |                           |
|                     |                                                                | n46     | 20, 40, 60, 80                                                                                              | 1                         |
|                     |                                                                | n48     | 5, 10, 15, 20, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> |                           |
| CA_n46A-n48(2A)     | CA_n46A-n48A                                                   | n46     | 10, 20, 40, 60, 80                                                                                          | 0                         |
|                     |                                                                | n48     | CA_n48(2A)_BCS0                                                                                             |                           |
| CA_n46A-n48(3A)     | CA_n46A-n48A                                                   | n46     | 10, 20, 40, 60, 80                                                                                          | 0                         |
|                     |                                                                | n48     | CA_n48(3A)_BCS0                                                                                             |                           |
| CA_n46A-n48(4A)     | CA_n46A-n48A                                                   | n46     | 10, 20, 40, 60, 80                                                                                          | 0                         |
|                     |                                                                | n48     | CA_n48(4A)_BCS0                                                                                             |                           |
| CA_n46A-n48B        | CA_n46A-n48A<br>CA_n46A-n48B                                   | n46     | 20, 40, 60, 80                                                                                              | 0                         |
|                     |                                                                | n48     | CA_n48B_BCS0                                                                                                |                           |
| CA_n46A-n48C        | CA_n46A-n48A                                                   | n46     | 20, 40, 60, 80                                                                                              | 0                         |
|                     |                                                                | n48     | CA_n48C_BCS0                                                                                                |                           |
| CA_n46B-n48A        | CA_n46A-n48A                                                   | n46     | CA_n46B_BCS0                                                                                                | 0                         |
|                     |                                                                | n48     | 20                                                                                                          |                           |
|                     |                                                                | n46     | CA_n46B_BCS0                                                                                                | 1                         |
|                     |                                                                | n48     | 5, 10, 15, 20, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> |                           |
| CA_n46B-n48(2A)     | CA_n46A-n48A                                                   | n46     | CA_n46B_BCS0                                                                                                | 0                         |
|                     |                                                                | n48     | CA_n48(2A)_BCS0                                                                                             |                           |
| CA_n46B-n48(3A)     | CA_n46A-n48A                                                   | n46     | CA_n46B_BCS0                                                                                                | 0                         |
|                     |                                                                | n48     | CA_n48(3A)_BCS0                                                                                             |                           |
| CA_n46B-n48(4A)     | CA_n46A-n48A                                                   | n46     | CA_n46B_BCS0                                                                                                | 0                         |
|                     |                                                                | n48     | CA_n48(4A)_BCS0                                                                                             |                           |
| CA_n46B-n48B        | CA_n46A-n48A<br>CA_n46A-n48B                                   | n46     | CA_n46B_BCS0                                                                                                | 0                         |
|                     |                                                                | n48     | CA_n48B_BCS0                                                                                                |                           |
| CA_n46B-n48C        | CA_n46A-n48A                                                   | n46     | CA_n46B_BCS0                                                                                                | 0                         |



| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                                                                            | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|-------------------------------------------------------------------------------------------------------------|---------------------------|
|                     |                                                                | n48     | CA_n48C_BCS0                                                                                                |                           |
| CA_n46C-n48A        | CA_n46A-n48A                                                   | n46     | CA_n46C_BCS0                                                                                                | 0                         |
|                     |                                                                | n48     | 20                                                                                                          |                           |
|                     |                                                                | n46     | CA_n46C_BCS0                                                                                                | 1                         |
|                     |                                                                | n48     | 5, 10, 15, 20, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> |                           |
| CA_n46C-n48(2A)     | CA_n46A-n48A                                                   | n46     | CA_n46C_BCS0                                                                                                | 0                         |
|                     |                                                                | n48     | CA_n48(2A)_BCS0                                                                                             |                           |
| CA_n46C-n48(3A)     | CA_n46A-n48A                                                   | n46     | CA_n46C_BCS0                                                                                                | 0                         |
|                     |                                                                | n48     | CA_n48(3A)_BCS0                                                                                             |                           |
| CA_n46C-n48(4A)     | CA_n46A-n48A                                                   | n46     | CA_n46C_BCS0                                                                                                | 0                         |
|                     |                                                                | n48     | CA_n48(4A)_BCS0                                                                                             |                           |
| CA_n46C-n48B        | CA_n46A-n48A<br>CA_n46A-n48B                                   | n46     | CA_n46C_BCS0                                                                                                | 0                         |
|                     |                                                                | n48     | CA_n48B_BCS0                                                                                                |                           |
| CA_n46C-n48C        | CA_n46A-n48A                                                   | n46     | CA_n46C_BCS0                                                                                                | 0                         |
|                     |                                                                | n48     | CA_n48C_BCS0                                                                                                |                           |
| CA_n46D-n48A        | CA_n46A-n48A                                                   | n46     | CA_n46D_BCS0                                                                                                | 0                         |
|                     |                                                                | n48     | 20                                                                                                          |                           |
|                     |                                                                | n46     | CA_n46D_BCS0                                                                                                | 1                         |
|                     |                                                                | n48     | 5, 10, 15, 20, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> |                           |
| CA_n46D-n48(2A)     | CA_n46A-n48A                                                   | n46     | CA_n46D_BCS0                                                                                                | 0                         |
|                     |                                                                | n48     | CA_n48(2A)_BCS0                                                                                             |                           |
| CA_n46D-n48(3A)     | CA_n46A-n48A                                                   | n46     | CA_n46D_BCS0                                                                                                | 0                         |
|                     |                                                                | n48     | CA_n48(3A)_BCS0                                                                                             |                           |
| CA_n46D-n48(4A)     | CA_n46A-n48A                                                   | n46     | CA_n46D_BCS0                                                                                                | 0                         |
|                     |                                                                | n48     | CA_n48(4A)_BCS0                                                                                             |                           |
| CA_n46D-n48B        | CA_n46A-n48A<br>CA_n46A-n48B                                   | n46     | CA_n46D_BCS0                                                                                                | 0                         |
|                     |                                                                | n48     | CA_n48B_BCS0                                                                                                |                           |
| CA_n46D-n48C        | CA_n46A-n48A                                                   | n46     | CA_n46D_BCS0                                                                                                | 0                         |
|                     |                                                                | n48     | CA_n48C_BCS0                                                                                                |                           |
| CA_n46M-n48A        | -                                                              | n46     | CA_n46M_BCS0                                                                                                | 0                         |
|                     |                                                                | n48     | 20                                                                                                          |                           |
| CA_n46M-n48(2A)     | -                                                              | n46     | CA_n46M_BCS0                                                                                                | 0                         |
|                     |                                                                | n48     | CA_n48(2A)_BCS0                                                                                             |                           |
| CA_n46M-n48(3A)     | -                                                              | n46     | CA_n46M_BCS0                                                                                                | 0                         |
|                     |                                                                | n48     | CA_n48(3A)_BCS0                                                                                             |                           |
| CA_n46M-n48(4A)     | -                                                              | n46     | CA_n46M_BCS0                                                                                                | 0                         |
|                     |                                                                | n48     | CA_n48(4A)_BCS0                                                                                             |                           |
| CA_n46M-n48B        | -                                                              | n46     | CA_n46M_BCS0                                                                                                | 0                         |
|                     |                                                                | n48     | CA_n48B_BCS0                                                                                                |                           |
| CA_n46M-n48C        | -                                                              | n46     | CA_n46M_BCS0                                                                                                | 0                         |
|                     |                                                                | n48     | CA_n48C_BCS0                                                                                                |                           |
| CA_n46N-n48A        | CA_n46A-n48A                                                   | n46     | CA_n46N_BCS1                                                                                                | 0                         |
|                     |                                                                | n48     | 5, 10, 15, 20, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> |                           |
| CA_n46N-n48(2A)     | CA_n46A-n48A                                                   | n46     | CA_n46N_BCS1                                                                                                | 0                         |
|                     |                                                                | n48     | CA_n48(2A)_BCS0                                                                                             |                           |
| CA_n46N-n48(3A)     | CA_n46A-n48A                                                   | n46     | CA_n46N_BCS1                                                                                                | 0                         |
|                     |                                                                | n48     | CA_n48(3A)_BCS0                                                                                             |                           |
| CA_n46N-n48(4A)     | CA_n46A-n48A                                                   | n46     | CA_n46N_BCS1                                                                                                | 0                         |
|                     |                                                                | n48     | CA_n48(4A)_BCS0                                                                                             |                           |
| CA_n46N-n48B        | CA_n46A-n48A<br>CA_n46A-n48B                                   | n46     | CA_n46N_BCS1                                                                                                | 0                         |
|                     |                                                                | n48     | CA_n48B_BCS0                                                                                                |                           |
| CA_n46N-n48C        | CA_n46A-n48A                                                   | n46     | CA_n46N_BCS1                                                                                                | 0                         |
|                     |                                                                | n48     | CA_n48C_BCS0                                                                                                |                           |
| CA_n46A-n66A        | -                                                              | n46     | 20, 40, 60, 80                                                                                              | 0                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                   |                           |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
| CA_n46A-n78A        | CA_n46A-n78A                                                   | n46     | 20, 40, 60, 80                                  | 0                         |
|                     |                                                                | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n46C-n78A        | CA_n46A-n78A                                                   | n46     | CA_n46C_BCS0                                    | 0                         |
|                     |                                                                | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n46D-n78A        | CA_n46A-n78A                                                   | n46     | CA_n46D_BCS0                                    | 0                         |
|                     |                                                                | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n46A-n96A        | -                                                              | n46     | 10, 20, 40, 60, 80                              | 0                         |
|                     |                                                                | n96     | 20, 40, 60, 80                                  |                           |
| CA_n46B-n96A        | -                                                              | n46     | CA_n46N_BCS1                                    | 0                         |
|                     |                                                                | n96     | 20, 40, 60, 80                                  |                           |
| CA_n46C-n96A        | -                                                              | n46     | CA_n46C_BCS0                                    | 0                         |
|                     |                                                                | n96     | 20, 40, 60, 80                                  |                           |
| CA_n46D-n96A        | -                                                              | n46     | CA_n46D_BCS0                                    | 0                         |
|                     |                                                                | n96     | 20, 40, 60, 80                                  |                           |
| CA_n46M-n96A        | -                                                              | n46     | CA_n46M_BCS0                                    | 0                         |
|                     |                                                                | n96     | 20, 40, 60, 80                                  |                           |
| CA_n46N-n96A        | -                                                              | n46     | CA_n46N_BCS0                                    | 0                         |
|                     |                                                                | n96     | 20, 40, 60, 80                                  |                           |
| CA_n46A-n96B        | -                                                              | n46     | 10, 20, 40, 60, 80                              | 0                         |
|                     |                                                                | n96     | CA_n96B_BCS0                                    |                           |
| CA_n46B-n96B        | -                                                              | n46     | CA_n46B_BCS0                                    | 0                         |
|                     |                                                                | n96     | CA_n96B_BCS0                                    |                           |
| CA_n46C-n96B        | -                                                              | n46     | CA_n46C_BCS0                                    | 0                         |
|                     |                                                                | n96     | CA_n96B_BCS0                                    |                           |
| CA_n46D-n96B        | -                                                              | n46     | CA_n46D_BCS0                                    | 0                         |
|                     |                                                                | n96     | CA_n96B_BCS0                                    |                           |
| CA_n46M-n96B        | -                                                              | n46     | CA_n46M_BCS0                                    | 0                         |
|                     |                                                                | n96     | CA_n96B_BCS0                                    |                           |
| CA_n46N-n96B        | -                                                              | n46     | CA_n46N_BCS1                                    | 0                         |
|                     |                                                                | n96     | CA_n96B_BCS0                                    |                           |
| CA_n46A-n96C        | -                                                              | n46     | 10, 20, 40, 60, 80                              | 0                         |
|                     |                                                                | n96     | CA_n96C_BCS0                                    |                           |
| CA_n46B-n96C        | -                                                              | n46     | CA_n46B_BCS0                                    | 0                         |
|                     |                                                                | n96     | CA_n96C_BCS0                                    |                           |
| CA_n46C-n96C        | -                                                              | n46     | CA_n46C_BCS0                                    | 0                         |
|                     |                                                                | n96     | CA_n96C_BCS0                                    |                           |
| CA_n46D-n96C        | -                                                              | n46     | CA_n46D_BCS0                                    | 0                         |
|                     |                                                                | n96     | CA_n96C_BCS0                                    |                           |
| CA_n46M-n96C        | -                                                              | n46     | CA_n46M_BCS0                                    | 0                         |
|                     |                                                                | n96     | CA_n96C_BCS0                                    |                           |
| CA_n46N-n96C        | -                                                              | n46     | CA_n46N_BCS1                                    | 0                         |
|                     |                                                                | n96     | CA_n96C_BCS0                                    |                           |
| CA_n46A-n96D        | -                                                              | n46     | 10, 20, 40, 60, 80                              | 0                         |
|                     |                                                                | n96     | CA_n96D_BCS0                                    |                           |
| CA_n46B-n96D        | -                                                              | n46     | CA_n46B_BCS0                                    | 0                         |
|                     |                                                                | n96     | CA_n96D_BCS0                                    |                           |
| CA_n46C-n96D        | -                                                              | n46     | CA_n46C_BCS0                                    | 0                         |
|                     |                                                                | n96     | CA_n96D_BCS0                                    |                           |
| CA_n46D-n96D        | -                                                              | n46     | CA_n46D_BCS0                                    | 0                         |
|                     |                                                                | n96     | CA_n96D_BCS0                                    |                           |
| CA_n46M-n96D        | -                                                              | n46     | CA_n46M_BCS0                                    | 0                         |
|                     |                                                                | n96     | CA_n96D_BCS0                                    |                           |
| CA_n46N-n96D        | -                                                              | n46     | CA_n46N_BCS1                                    | 0                         |
|                     |                                                                | n96     | CA_n96D_BCS0                                    |                           |
| CA_n46A-n96E        | -                                                              | n46     | 10, 20, 40, 60, 80                              | 0                         |
|                     |                                                                | n96     | CA_n96E_BCS0                                    |                           |
| CA_n46B-n96E        | -                                                              | n46     | CA_n46B_BCS0                                    | 0                         |
|                     |                                                                | n96     | CA_n96E_BCS0                                    |                           |
| CA_n46C-n96E        | -                                                              | n46     | CA_n46C_BCS0                                    | 0                         |
|                     |                                                                | n96     | CA_n96E_BCS0                                    |                           |
| CA_n46D-n96E        | -                                                              | n46     | CA_n46D_BCS0                                    | 0                         |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3) | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|----------------------------------|---------------------------|
|                     |                                                                | n96     | CA_n96E_BCS0                     |                           |
| CA_n46M-n96E        | -                                                              | n46     | CA_n46M_BCS0                     | 0                         |
|                     |                                                                | n96     | CA_n96E_BCS0                     |                           |
| CA_n46N-n96E        | -                                                              | n46     | CA_n46N_BCS1                     | 0                         |
|                     |                                                                | n96     | CA_n96E_BCS0                     |                           |

**Table 5.5A.3.1-1l: NR CA configurations and bandwidth combinations sets defined for inter-band CA (two bands)**

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                                                                                                  | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|-----------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| CA_n48A-n53A        | -                                                              | n48     | 5, 10, 15, 20, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup>                       | 0                         |
|                     |                                                                | n53     | 5, 10                                                                                                                             |                           |
| CA_n48(2A)-n53A     | -                                                              | n48     | CA_n48(2A)_BCS0                                                                                                                   | 0                         |
|                     |                                                                | n53     | 5, 10                                                                                                                             |                           |
| CA_n48A-n66A        | CA_n48A-n66A                                                   | n48     | 5, 10, 15, 20, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup>                       | 0                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 40                                                                                                                 |                           |
|                     |                                                                | n48     | 5, 10, 15, 20, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup>                       | 1                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                         |                           |
|                     |                                                                | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 70 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> | 2                         |
|                     |                                                                |         | 5, 10, 15, 20, 25, 30, 40,                                                                                                        |                           |
| CA_n48A-n66(2A)     | CA_n48A-n66A                                                   | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 70 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> | 0                         |
|                     |                                                                | n66     | CA_n66(2A)_BCS0                                                                                                                   |                           |
| CA_n48B-n66A        | CA_n48A-n66A                                                   | n48     | CA_n48B_BCS0                                                                                                                      | 0                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 40                                                                                                                 |                           |
|                     |                                                                | n48     | CA_n48B_BCS1                                                                                                                      | 1                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                         |                           |
|                     |                                                                | n48     | CA_n48B_BCS2                                                                                                                      | 2                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                         |                           |
| CA_n48B-n66(2A)     | CA_n48A-n66A                                                   | n48     | CA_n48B_BCS2                                                                                                                      | 0                         |
|                     |                                                                | n66     | CA_n66(2A)_BCS0                                                                                                                   |                           |
| CA_n48C-n66A        | CA_n48A-n66A                                                   | n48     | CA_n48C_BCS0                                                                                                                      | 0                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 40                                                                                                                 |                           |
|                     |                                                                | n48     | CA_n48C_BCS0                                                                                                                      | 1                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                         |                           |
| CA_n48(2A)-n66A     | CA_n48A-n66A                                                   | n48     | CA_n48(2A)_BCS0                                                                                                                   | 0                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 40                                                                                                                 |                           |
|                     |                                                                | n48     | CA_n48(2A)_BCS0                                                                                                                   | 1                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                         |                           |
|                     |                                                                | n48     | CA_n48(2A)_BCS1                                                                                                                   | 2                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                         |                           |
| CA_n48(2A)-n66(2A)  | CA_n48A-n66A                                                   | n48     | CA_n48(2A)_BCS1                                                                                                                   | 0                         |
|                     |                                                                | n66     | CA_n66(2A)_BCS0                                                                                                                   |                           |
| CA_n48(A-B)-n66A    | CA_n48A-n66A                                                   | n48     | CA_n48(A-B)_BCS0                                                                                                                  | 0                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                         |                           |
|                     |                                                                | n48     | CA_n48(A-B)_BCS1                                                                                                                  | 1                         |
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                         |                           |
| CA_n48A-n70A        | CA_n48A-n70A                                                   | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 70 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> | 0                         |
|                     |                                                                | n70     | 5, 10, 15, 20 <sup>1</sup> , 25 <sup>1</sup>                                                                                      |                           |
| CA_n48(2A)-n70A     | CA_n48A-n70A                                                   | n48     | CA_n48(2A)_BCS1                                                                                                                   | 0                         |
|                     |                                                                | n70     | 5, 10, 15, 20, 25                                                                                                                 |                           |
| CA_n48B-n70A        | CA_n48A-n70A                                                   | n48     | CA_n48B_BCS2                                                                                                                      | 0                         |
|                     |                                                                | n70     | 5, 10, 15, 20 <sup>1</sup> , 25 <sup>1</sup>                                                                                      |                           |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                                                                                                  | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|-----------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| CA_n48A-n71A        | CA_n48A-n71A                                                   | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 70 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> | 0                         |
|                     |                                                                | n71     | 5, 10, 15, 20                                                                                                                     |                           |
| CA_n48A-n71(2A)     | CA_n48A-n71A                                                   | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 70 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> | 0                         |
|                     |                                                                | n71     | CA_n71(2A) BCS0                                                                                                                   |                           |
| CA_n48(2A)-n71A     | CA_n48A-n71A                                                   | n48     | CA_n48(2A) BCS1                                                                                                                   | 0                         |
|                     |                                                                | n71     | 5, 10, 15, 20                                                                                                                     |                           |
| CA_n48(2A)-n71(2A)  | CA_n48A-n71A                                                   | n48     | CA_n48(2A) BCS1                                                                                                                   | 0                         |
|                     |                                                                | n71     | CA_n71(2A) BCS0                                                                                                                   |                           |
| CA_n48(3A)-n71A     | CA_n48A-n71A                                                   | n48     | CA_n48(3A) BCS0                                                                                                                   | 0                         |
|                     |                                                                | n71     | 5, 10, 15, 20                                                                                                                     |                           |
| CA_n48(4A)-n71A     | CA_n48A-n71A                                                   | n48     | CA_n48(4A) BCS0                                                                                                                   | 0                         |
|                     |                                                                | n71     | 5, 10, 15, 20                                                                                                                     |                           |
| CA_n48B-n71A        | CA_n48A-n71A                                                   | n48     | CA_n48B BCS2                                                                                                                      | 0                         |
|                     |                                                                | n71     | 5, 10, 15, 20                                                                                                                     |                           |
| CA_n48B-n71(2A)     | CA_n48A-n71A                                                   | n48     | CA_n48B BCS2                                                                                                                      | 0                         |
|                     |                                                                | n71     | CA_n71(2A) BCS0                                                                                                                   |                           |
| CA_n48C-n71A        | CA_n48A-n71A                                                   | n48     | CA_n48C BCS0                                                                                                                      | 0                         |
|                     |                                                                | n71     | 5, 10, 15, 20                                                                                                                     |                           |
| CA_n48A-n77A        | n77 <sup>8,9</sup>                                             | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 70 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> | 0                         |
|                     |                                                                | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |                           |
| CA_n48A-n77C        | n77 <sup>8</sup>                                               | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 70 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> | 0                         |
|                     |                                                                | n77     | CA_n77C BCS0                                                                                                                      |                           |
|                     |                                                                | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 70 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> | 1                         |
|                     |                                                                | n77     | CA_n77C BCS1                                                                                                                      |                           |
| CA_n48A-n77(2A)     | -                                                              | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 70 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> | 0                         |
|                     |                                                                | n77     | CA_n77(2A) BCS0                                                                                                                   |                           |
| CA_n48(2A)-n77A     | n77 <sup>8,9</sup>                                             | n48     | CA_n48(2A) BCS0                                                                                                                   | 0                         |
|                     |                                                                | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |                           |
|                     |                                                                | n48     | CA_n48(2A) BCS1                                                                                                                   | 1                         |
|                     |                                                                | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |                           |
| CA_n48(2A)-n77C     | n77 <sup>8</sup>                                               | n48     | CA_n48(2A) BCS0                                                                                                                   | 0                         |
|                     |                                                                | n77     | CA_n77C BCS0                                                                                                                      | 1                         |
|                     |                                                                | n48     | CA_n48(2A) BCS0                                                                                                                   |                           |
|                     |                                                                | n77     | CA_n77C BCS1                                                                                                                      | 2                         |
|                     |                                                                | n48     | CA_n48(2A) BCS1                                                                                                                   |                           |
|                     |                                                                | n77     | CA_n77C BCS0                                                                                                                      | 3                         |
|                     |                                                                | n48     | CA_n48(2A) BCS1                                                                                                                   |                           |
|                     |                                                                | n77     | CA_n77C BCS1                                                                                                                      |                           |
| CA_n48(2A)-n77(2A)  | -                                                              | n48     | CA_n48(2A) BCS0                                                                                                                   | 0                         |
|                     |                                                                | n77     | CA_n77(2A) BCS0                                                                                                                   |                           |
| CA_n48B-n77A        | n77 <sup>8,9</sup>                                             | n48     | CA_n48B BCS0                                                                                                                      | 0                         |
|                     |                                                                | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |                           |
|                     |                                                                | n48     | CA_n48B BCS1                                                                                                                      | 1                         |
|                     |                                                                | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |                           |
|                     |                                                                | n48     | CA_n48B BCS2                                                                                                                      | 2                         |
| CA_n48B-n77C        | n77 <sup>8</sup>                                               | n48     | CA_n48B BCS0                                                                                                                      | 0                         |
|                     |                                                                | n77     | CA_n77C BCS0                                                                                                                      |                           |
|                     |                                                                | n48     | CA_n48B BCS0                                                                                                                      | 1                         |
|                     |                                                                | n77     | CA_n77C BCS1                                                                                                                      |                           |
|                     |                                                                | n48     | CA_n48B BCS2                                                                                                                      | 2                         |
|                     |                                                                | n77     | CA_n77C BCS0                                                                                                                      |                           |
|                     |                                                                | n48     | CA_n48B BCS2                                                                                                                      | 3                         |
|                     |                                                                | n77     | CA_n77C BCS1                                                                                                                      |                           |
| CA_n48(A-B)-n77A    | n77 <sup>8,9</sup>                                             | n48     | CA_n48(A-B) BCS0                                                                                                                  | 0                         |
|                     |                                                                | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |                           |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                                                                                                  | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|-----------------------------------------------------------------------------------------------------------------------------------|---------------------------|
|                     |                                                                | n48     | CA n48(A-B) BCS1                                                                                                                  |                           |
|                     |                                                                | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   | 1                         |
| CA_n48A-n96A        | CA_n48A-n96A                                                   | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 70 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> | 0                         |
|                     |                                                                | n96     | 20, 40, 60, 80                                                                                                                    |                           |
| CA_n48(2A)-n96A     | CA_n48A-n96A                                                   | n48     | CA_n48(2A) BCS0                                                                                                                   | 0                         |
|                     |                                                                | n96     | 20, 40, 60, 80                                                                                                                    |                           |
| CA_n48(2A)-n96B     | CA_n48A-n96B                                                   | n48     | CA_n48(2A) BCS0                                                                                                                   | 0                         |
|                     |                                                                | n96     | CA_n96B BCS0                                                                                                                      |                           |
| CA_n48(2A)-n96C     | CA_n48A-n96A                                                   | n48     | CA_n48(2A) BCS0                                                                                                                   | 0                         |
|                     |                                                                | n96     | CA_n96C BCS0                                                                                                                      |                           |
| CA_n48(2A)-n96D     | CA_n48A-n96A                                                   | n48     | CA_n48(2A) BCS0                                                                                                                   | 0                         |
|                     |                                                                | n96     | CA_n96D BCS0                                                                                                                      |                           |
| CA_n48(2A)-n96E     | CA_n48A-n96A                                                   | n48     | CA_n48(2A) BCS0                                                                                                                   | 0                         |
|                     |                                                                | n96     | CA_n96E BCS0                                                                                                                      |                           |
| CA_n48(3A)-n96A     | CA_n48A-n96A                                                   | n48     | CA_n48(3A) BCS0                                                                                                                   | 0                         |
|                     |                                                                | n96     | 20, 40, 60, 80                                                                                                                    |                           |
| CA_n48(3A)-n96B     | CA_n48A-n96B                                                   | n48     | CA_n48(3A) BCS0                                                                                                                   | 0                         |
|                     |                                                                | n96     | CA_n96B BCS0                                                                                                                      |                           |
| CA_n48(3A)-n96C     | CA_n48A-n96A                                                   | n48     | CA_n48(3A) BCS0                                                                                                                   | 0                         |
|                     |                                                                | n96     | CA_n96C BCS0                                                                                                                      |                           |
| CA_n48(3A)-n96D     | CA_n48A-n96A                                                   | n48     | CA_n48(3A) BCS0                                                                                                                   | 0                         |
|                     |                                                                | n96     | CA_n96D BCS0                                                                                                                      |                           |
| CA_n48(3A)-n96E     | CA_n48A-n96A                                                   | n48     | CA_n48(3A) BCS0                                                                                                                   | 0                         |
|                     |                                                                | n96     | CA_n96E BCS0                                                                                                                      |                           |
| CA_n48(4A)-n96A     | CA_n48A-n96A                                                   | n48     | CA_n48(4A) BCS0                                                                                                                   | 0                         |
|                     |                                                                | n96     | 20, 40, 60, 80                                                                                                                    |                           |
| CA_n48(4A)-n96B     | CA_n48A-n96A                                                   | n48     | CA_n48(4A) BCS0                                                                                                                   | 0                         |
|                     |                                                                | n96     | CA_n96B BCS0                                                                                                                      |                           |
| CA_n48(4A)-n96C     | CA_n48A-n96A                                                   | n48     | CA_n48(4A) BCS0                                                                                                                   | 0                         |
|                     |                                                                | n96     | CA_n96C BCS0                                                                                                                      |                           |
| CA_n48(4A)-n96D     | CA_n48A-n96A                                                   | n48     | CA_n48(4A) BCS0                                                                                                                   | 0                         |
|                     |                                                                | n96     | CA_n96D BCS0                                                                                                                      |                           |
| CA_n48(4A)-n96E     | CA_n48A-n96A                                                   | n48     | CA_n48(4A) BCS0                                                                                                                   | 0                         |
|                     |                                                                | n96     | CA_n96E BCS0                                                                                                                      |                           |
| CA_n48A-n96B        | CA_n48A-n96A                                                   | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 70 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> | 0                         |
|                     |                                                                | n96     | CA_n96B BCS0                                                                                                                      |                           |
| CA_n48A-n96C        | CA_n48A-n96A                                                   | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 70 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> | 0                         |
|                     |                                                                | n96     | CA_n96C BCS0                                                                                                                      |                           |
| CA_n48A-n96D        | CA_n48A-n96A                                                   | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 70 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> | 0                         |
|                     |                                                                | n96     | CA_n96D BCS0                                                                                                                      |                           |
| CA_n48A-n96E        | CA_n48A-n96A                                                   | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 70 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> | 0                         |
|                     |                                                                | n96     | CA_n96E BCS0                                                                                                                      |                           |
| CA_n48B-n96A        | CA_n48A-n96A<br>CA_n48B-n96A                                   | n48     | CA_n48B BCS0                                                                                                                      | 0                         |
|                     |                                                                | n96     | 20, 40, 60, 80                                                                                                                    |                           |
| CA_n48B-n96B        | CA_n48A-n96A<br>CA_n48B-n96A                                   | n48     | CA_n48B BCS0                                                                                                                      | 0                         |
|                     |                                                                | n96     | CA_n96B BCS0                                                                                                                      |                           |
| CA_n48B-n96C        | CA_n48A-n96A<br>CA_n48B-n96A                                   | n48     | CA_n48B BCS0                                                                                                                      | 0                         |
|                     |                                                                | n96     | CA_n96C BCS0                                                                                                                      |                           |
| CA_n48B-n96D        | CA_n48A-n96A<br>CA_n48B-n96A                                   | n48     | CA_n48B BCS0                                                                                                                      | 0                         |
|                     |                                                                | n96     | CA_n96D BCS0                                                                                                                      |                           |
| CA_n48B-n96E        | CA_n48A-n96A<br>CA_n48B-n96A                                   | n48     | CA_n48B BCS0                                                                                                                      | 0                         |
|                     |                                                                | n96     | CA_n96E BCS0                                                                                                                      |                           |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)               | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|------------------------------------------------|---------------------------|
| CA_n48C-n96A        | CA_n48A-n96A                                                   | n48     | CA_n48C_BCS0                                   | 0                         |
|                     |                                                                | n96     | 20, 40, 60, 80                                 |                           |
| CA_n48C-n96B        | CA_n48A-n96A                                                   | n48     | CA_n48C_BCS0                                   | 0                         |
|                     |                                                                | n96     | CA_n96B_BCS0                                   |                           |
| CA_n48C-n96C        | CA_n48A-n96A                                                   | n48     | CA_n48C_BCS0                                   | 0                         |
|                     |                                                                | n96     | CA_n96C_BCS0                                   |                           |
| CA_n48C-n96D        | CA_n48A-n96A                                                   | n48     | CA_n48C_BCS0                                   | 0                         |
|                     |                                                                | n96     | CA_n96D_BCS0                                   |                           |
| CA_n48C-n96E        | CA_n48A-n96A                                                   | n48     | CA_n48C_BCS0                                   | 0                         |
|                     |                                                                | n96     | CA_n96E_BCS0                                   |                           |
| CA_n50A-n78A        | CA_n50A-n78A                                                   | n50     | 5, 10, 15, 20, 30, 40, 50, 60, 80 <sup>1</sup> | 0                         |
|                     |                                                                | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100            |                           |

**Table 5.5A.3.1-1m: NR CA configurations and bandwidth combinations sets defined for inter-band CA (two bands)**

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)             | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|----------------------------------------------|---------------------------|
| CA_n66A-n70A        | -                                                              | n66     | 5, 10, 15, 20, 40                            | 0                         |
|                     |                                                                | n70     | 5, 10, 15, 20 <sup>1</sup> , 25 <sup>1</sup> |                           |
| CA_n66B-n70A        | -                                                              | n66     | CA_n66B_BCS0                                 | 0                         |
|                     |                                                                | n70     | 5, 10, 15, 20 <sup>1</sup> , 25 <sup>1</sup> |                           |
| CA_n66(2A)-n70A     | -                                                              | n66     | CA_n66(2A)_BCS0                              | 0                         |
|                     |                                                                | n70     | 5, 10, 15, 20 <sup>1</sup> , 25 <sup>1</sup> |                           |
| CA_n66A-n71A        | CA_n66A-n71A                                                   | n66     | 5, 10, 15, 20, 40                            | 0                         |
|                     |                                                                | n71     | 5, 10, 15, 20                                |                           |
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40                    | 1                         |
|                     |                                                                | n71     | 5, 10, 15, 20                                |                           |
|                     |                                                                | n66     | n66 channel bandwidths in Table 5.3.5-1      | 4 and 5                   |
|                     |                                                                | n71     | n71 channel bandwidths in Table 5.3.5-1      |                           |
| CA_n66A-n71B        | CA_n66A-n71A                                                   | n66     | 5, 10, 15, 20, 25, 30, 40                    | 0                         |
|                     |                                                                | n71     | CA_n71B_BCS0                                 |                           |
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40                    | 1                         |
|                     |                                                                | n71     | CA_n71B_BCS2                                 |                           |
|                     |                                                                | n66     | n66 channel bandwidths in Table 5.3.5-1      | 4 and 5                   |
|                     |                                                                | n71     | CA_n71B_BCS 4 and 5                          |                           |
| CA_n66A-n71(2A)     | CA_n66A-n71A                                                   | n66     | 5, 10, 15, 20, 40                            | 0                         |
|                     |                                                                | n71     | CA_n71(2A)_BCS0                              |                           |
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40                    | 1                         |
|                     |                                                                | n71     | CA_n71(2A)_BCS0                              |                           |
|                     |                                                                | n66     | n66 channel bandwidths in Table 5.3.5-1      | 4 and 5                   |
|                     |                                                                | n71     | CA_n71(2A)_BCS 4 and 5                       |                           |
| CA_n66(2A)-n71A     | CA_n66A-n71A                                                   | n66     | CA_n66(2A)_BCS0                              | 0                         |
|                     |                                                                | n71     | 5, 10, 15, 20                                |                           |
|                     |                                                                | n66     | CA_n66(2A)_BCS1                              | 1                         |
|                     |                                                                | n71     | 5, 10, 15, 20                                |                           |
|                     |                                                                | n66     | CA_n66(2A)_BCS 4 and 5                       | 4 and 5                   |
|                     |                                                                | n71     | n71 channel bandwidths in Table 5.3.5-1      |                           |
| CA_n66(2A)-n71B     | CA_n66A-n71A                                                   | n66     | CA_n66(2A)_BCS1                              | 0                         |
|                     |                                                                | n71     | CA_n71B_BCS2                                 |                           |
|                     |                                                                | n66     | CA_n66(2A)_BCS 4 and 5                       | 4 and 5                   |
|                     |                                                                | n71     | CA_n71B_BCS 4 and 5                          |                           |
| CA_n66(2A)-n71(2A)  | CA_n66A-n71A                                                   | n66     | CA_n66(2A)_BCS1                              | 0                         |
|                     |                                                                | n71     | CA_n71(2A)_BCS0                              |                           |
|                     |                                                                | n66     | CA_n66(2A)_BCS 4 and 5                       | 4 and 5                   |
|                     |                                                                | n71     | CA_n71(2A)_BCS 4 and 5                       |                           |
| CA_n66B-n71A        | CA_n66A-n71A                                                   | n66     | CA_n66B_BCS0                                 | 0                         |
|                     |                                                                | n71     | 5, 10, 15, 20                                |                           |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
| CA_n66A-n77A        | n77 <sup>8,9</sup><br>CA_n66A-n77A <sup>8</sup>                | n66     | 5, 10, 15, 20, 40                               | 0                         |
|                     |                                                                | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40                       | 1                         |
|                     |                                                                | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                     |                                                                | n66     | n66 channel bandwidths in Table 5.3.5-1         | 4 and 5                   |
|                     |                                                                | n77     | n77 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n66(2A)-n77A     | n77 <sup>8,9</sup><br>CA_n66A-n77A <sup>8</sup>                | n66     | CA_n66(2A)_BCS1                                 | 0                         |
|                     |                                                                | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                     |                                                                | n66     | CA_n66(2A)_BCS1                                 | 1                         |
|                     |                                                                | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                     |                                                                | n66     | CA_n66(2A)_BCS 4 and 5                          | 4 and 5                   |
|                     |                                                                | n77     | n77 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n66A-n77(2A)     | n77 <sup>8,9</sup><br>CA_n66A-n77A <sup>8</sup><br>CA_n77(2A)  | n66     | 5, 10, 15, 20, 40                               | 0                         |
|                     |                                                                | n77     | CA_n77(2A)_BCS0                                 |                           |
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40                       | 1                         |
|                     |                                                                | n77     | CA_n77(2A)_BCS1                                 |                           |
|                     |                                                                | n66     | n66 channel bandwidths in Table 5.3.5-1         | 4 and 5                   |
|                     |                                                                | n77     | CA_n77(2A)_BCS 4 and 5                          |                           |
| CA_n66(3A)-n77A     | n77 <sup>8</sup><br>CA_n66A-n77A <sup>8</sup>                  | n66     | CA_n66(3A)_BCS0                                 | 0                         |
|                     |                                                                | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n66(2A)-n77(2A)  | n77 <sup>8</sup><br>CA_n66A-n77A <sup>8</sup><br>CA_n77(2A)    | n66     | CA_n66(2A)_BCS0                                 | 0                         |
|                     |                                                                | n77     | CA_n77(2A)_BCS0                                 |                           |
|                     |                                                                | n66     | CA_n66(2A)_BCS1                                 | 1                         |
|                     |                                                                | n77     | CA_n77(2A)_BCS1                                 |                           |
|                     |                                                                | n66     | CA_n66(2A)_BCS 4 and 5                          | 4 and 5                   |
|                     |                                                                | n77     | CA_n77(2A)_BCS 4 and 5                          |                           |
| CA_n66A-n77C        | n77 <sup>8</sup><br>CA_n66A-n77A <sup>8</sup>                  | n66     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                     |                                                                | n77     | CA_n77C_BCS1                                    |                           |
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40                       | 1                         |
|                     |                                                                | n77     | CA_n77C_BCS1                                    |                           |
| CA_n66(2A)-n77C     | n77 <sup>8</sup><br>CA_n66A-n77A <sup>8</sup>                  | n66     | CA_n66(2A)_BCS0                                 | 0                         |
|                     |                                                                | n77     | CA_n77C_BCS1                                    |                           |
|                     |                                                                | n66     | CA_n66(2A)_BCS1                                 | 1                         |
|                     |                                                                | n77     | CA_n77C_BCS1                                    |                           |
| CA_n66B-n77A        | n77 <sup>8,9</sup><br>CA_n66A-n77A <sup>8</sup>                | n66     | CA_n66B_BCS0                                    | 0                         |
|                     |                                                                | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n66B-n77C        | n77 <sup>8</sup><br>CA_n66A-n77A <sup>8</sup>                  | n66     | CA_n66B_BCS0                                    | 0                         |
|                     |                                                                | n77     | CA_n77C_BCS0                                    |                           |
|                     |                                                                | n66     | CA_n66B_BCS0                                    | 1                         |
|                     |                                                                | n77     | CA_n77C_BCS1                                    |                           |
| CA_n66A-n78A        | CA_n66A-n78A                                                   | n66     | 5, 10, 15, 20, 40                               | 0                         |
|                     |                                                                | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100             |                           |
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40                       | 1                         |
|                     |                                                                | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n66A-n78(2A)     | CA_n66A-n78A                                                   | n66     | 5, 10, 15, 20, 30, 40                           | 0                         |
|                     |                                                                | n78     | CA_n78(2A)_BCS1                                 |                           |
|                     |                                                                | n66     | 5, 10, 15, 20, 25, 30, 40                       | 1                         |
|                     |                                                                | n78     | CA_n78(2A)_BCS2                                 |                           |
| CA_n66(2A)-n78A     | CA_n66A-n78A                                                   | n66     | CA_n66(2A)_BCS0                                 | 0                         |
|                     |                                                                | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100     |                           |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
|                     |                                                                | n66     | CA_n66(2A)_BCS1                                 |                           |
| CA_n66(2A)-n78(2A)  | CA_n66A-n78A                                                   | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 1                         |
|                     |                                                                | n66     | CA_n66(2A)_BCS0                                 |                           |
|                     |                                                                | n78     | CA_n78(2A)_BCS1                                 | 0                         |
|                     |                                                                | n66     | CA_n66(2A)_BCS1                                 |                           |
|                     |                                                                | n78     | CA_n78(2A)_BCS2                                 |                           |
|                     |                                                                | n66     | CA_n66(2A)_BCS1                                 | 1                         |
|                     |                                                                | n78     | CA_n78(2A)_BCS2                                 |                           |

**Table 5.5A.3.1-1n: NR CA configurations and bandwidth combinations sets defined for inter-band CA (two bands)**

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|---------------------|----------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
| CA_n70A-n71A        | CA_n70A-n71A                                                   | n70     | 5, 10, 15, 20 <sup>1</sup> , 25 <sup>1</sup>    | 0                         |
|                     |                                                                | n71     | 5, 10, 15, 20                                   |                           |
| CA_n70A-n71(2A)     | CA_n70A-n71A                                                   | n70     | 5, 10, 15, 20 <sup>1</sup> , 25 <sup>1</sup>    | 0                         |
|                     |                                                                | n71     | CA_n71(2A)_BCS0                                 |                           |
| CA_n70A-n78A        | CA_n70A-n78A                                                   | n70     | 5, 10, 15, 20 <sup>1</sup> , 25 <sup>1</sup>    | 0                         |
|                     |                                                                | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n71A-n77A        | n77 <sup>8,9</sup><br>CA_n71A-n77A <sup>8</sup>                | n71     | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                     |                                                                | n71     | n71 channel bandwidths in Table 5.3.5-1         | 4 and 5                   |
|                     |                                                                | n77     | n77 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n71A-n77(2A)     | n77 <sup>8,9</sup><br>CA_n71A-n77A <sup>8</sup>                | n71     | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n77     | CA_n77(2A)_BCS1                                 |                           |
|                     |                                                                | n71     | n71 channel bandwidths in Table 5.3.5-1         | 4 and 5                   |
|                     |                                                                | n77     | CA_n77(2A)_BCS 4 and 5                          |                           |
| CA_n71B-n77A        | n77 <sup>8,9</sup><br>CA_n71A-n77A <sup>8</sup>                | n71     | CA_n71B_BCS2                                    | 0                         |
|                     |                                                                | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                     |                                                                | n71     | CA_n71B_BCS 4 and 5                             | 4 and 5                   |
|                     |                                                                | n77     | CA_n77(2A)_BCS 4 and 5                          |                           |
| CA_n71B-n77(2A)     | CA_n71A-n77A                                                   | n71     | CA_n71B_BCS2                                    | 0                         |
|                     |                                                                | n77     | CA_n77(2A)_BCS1                                 |                           |
|                     |                                                                | n71     | CA_n71B_BCS 4 and 5                             | 4 and 5                   |
|                     |                                                                | n77     | CA_n77(2A)_BCS 4 and 5                          |                           |
| CA_n71(2A)-n77A     | n77 <sup>8,9</sup><br>CA_n71A-n77A <sup>8</sup>                | n71     | CA_n71(2A)_BCS0                                 | 0                         |
|                     |                                                                | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                     |                                                                | n71     | CA_n71(2A)_BCS 4 and 5                          | 4 and 5                   |
|                     |                                                                | n77     | n77 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n71(2A)-n77(2A)  | CA_n71A-n77A                                                   | n71     | CA_n71(2A)_BCS0                                 | 0                         |
|                     |                                                                | n77     | CA_n77(2A)_BCS1                                 |                           |
|                     |                                                                | n71     | CA_n71(2A)_BCS 4 and 5                          | 4 and 5                   |
|                     |                                                                | n77     | CA_n77(2A)_BCS 4 and 5                          |                           |
| CA_n71A-n78A        | CA_n71A-n78A                                                   | n71     | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n71A-n78(2A)     | CA_n71A-n78A                                                   | n71     | 10, 15, 20                                      | 0                         |
|                     |                                                                | n78     | CA_n78(2A)_BCS2                                 |                           |
| CA_n74A-n77A        | CA_n74A-n77A                                                   | n74     | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n77     | 10, 15, 20, 40, 50, 60, 80, 90, 100             |                           |
| CA_n74A-n78A        | CA_n74A-n78A                                                   | n74     | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100             |                           |
| CA_n75A-n78A        | -                                                              | n75     | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100             |                           |
| CA_n75A-n78(2A)     | -                                                              | n75     | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                | n78     | CA_n78(2A)_BCS1                                 |                           |



| NR CA configuration       | Uplink CA configuration or single uplink carrier <sup>10</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|---------------------------|----------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
| CA_n76A-n78A              | -                                                              | n76     | 5                                               | 0                         |
|                           |                                                                | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100             |                           |
| CA_n77A-n78A <sup>2</sup> | -                                                              | n77     | 10, 15, 20, 40, 50, 60, 80, 90, 100             | 0                         |
|                           |                                                                | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100             |                           |
| CA_n77A-n79A              | CA_n77A-n79A                                                   | n77     | 10, 15, 20, 40, 50, 60, 80, 90, 100             | 0                         |
|                           |                                                                | n79     | 40, 50, 60, 80, 100                             |                           |
| CA_n77(2A)-n79A           | CA_n77A-n79A                                                   | n77     | CA_n77(2A)_BCS1                                 | 0                         |
|                           |                                                                | n79     | 40, 50, 60, 80, 100                             |                           |
| CA_n77(3A)-n79A           | CA_n77A-n79A                                                   | n77     | CA_n77(3A)_BCS1                                 | 0                         |
|                           |                                                                | n79     | 40, 50, 60, 80, 100                             |                           |
| CA_n78A-n79A              | CA_n78A-n79A                                                   | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100             | 0                         |
|                           |                                                                | n79     | 40, 50, 60, 80, 100                             |                           |
|                           |                                                                | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100     | 1                         |
|                           |                                                                | n79     | 40, 50, 60, 80, 100                             |                           |
| CA_n78A-n79C              | -                                                              | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 0                         |
|                           |                                                                | n79     | CA_n79C_BCS0                                    |                           |
| CA_n78(2A)-n79A           | CA_n78A-n79A                                                   | n78     | CA_n78(2A)_BCS1                                 | 0                         |
|                           |                                                                | n79     | 40, 50, 60, 80, 100                             |                           |
| CA_n78A-n92A              | CA_n78A-n92A                                                   | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100             | 0                         |
|                           |                                                                | n92     | 5, 10, 15, 20                                   |                           |
| CA_n78(2A)-n92A           | CA_n78A-n92A                                                   | n78     | CA_n78(2A)_BCS0                                 | 0                         |
|                           |                                                                | n92     | 5, 10, 15, 20                                   |                           |

The following notes are applied to the above tables:

NOTE 1: This UE channel bandwidth is applicable only to downlink.

NOTE 2: The minimum requirements for intra-band contiguous or non-contiguous CA apply.

NOTE 3: For each channel bandwidth of each component carrier, refer to Table 5.3.5-1 for the applicable SCSs. For a given band, not all UE channel bandwidths support the same SCSs..

NOTE 4: This UE channel bandwidth is optional in this release of the specification.

NOTE 5: For this bandwidth, the minimum requirements are restricted to operation when carrier is configured as a SCell part of DC or CA configuration.

NOTE 6: For this bandwidth, the minimum requirements are restricted to operation when carrier is configured as a downlink SCell part of CA configuration

NOTE 7: Limited to operation at 3450-3550 MHz and 3700–3980 MHz.

NOTE 8: Minimum requirements for Power Class 2 are applicable for this uplink combination or single uplink carrier in this downlink/uplink combination

NOTE 9: Minimum requirements for Power Class 1.5 are applicable for this uplink combination or single uplink carrier in this downlink/uplink combination

NOTE 10: Only single uplink carriers with power class other than PC3 are listed.

NOTE 11: The CA configurations are given in Table 5.5A.1-1 or Table 5.5A.2-1 in this specification

### 5.5A.3.2 Configurations for inter-band CA (three bands)

**Table 5.5A.3.2-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)**

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3) | Bandwidth combination set |
|---------------------|---------------------------------------------------------------|---------|----------------------------------|---------------------------|
| CA_n1A-n3A-n5A      | CA_n1A-n3A<br>CA_n1A-n5A<br>CA_n3A-n5A                        | n1      | 5, 10, 15, 20, 25, 30, 40, 50    | 0                         |
|                     |                                                               | n3      | 5, 10, 15, 20, 25, 30, 40, 50    |                           |
|                     |                                                               | n5      | 5, 10, 15, 20                    |                           |
| CA_n1A-n3A-n7A      | -                                                             | n1      | 5, 10, 15, 20                    | 0                         |

| NR CA configuration  | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)             | Bandwidth combination set |
|----------------------|---------------------------------------------------------------|---------|----------------------------------------------|---------------------------|
|                      | CA_n1A-n3A<br>CA_n1A-n7A<br>CA_n3A-n7A                        | n3      | 5, 10, 15, 20, 25, 30                        |                           |
|                      |                                                               | n7      | 5, 10, 15, 20, 25, 30, 40, 50                |                           |
|                      |                                                               | n1      | 5, 10, 15, 20, 25, 30, 40, 50                | 1                         |
|                      |                                                               | n3      | 5, 10, 15, 20, 25, 30, 40                    |                           |
|                      |                                                               | n7      | 5, 10, 15, 20, 25, 30, 40, 50                |                           |
|                      |                                                               | n1      | 5, 10, 15, 20                                | 2                         |
|                      |                                                               | n3      | 5, 10, 15, 20, 25, 30, 40                    |                           |
|                      |                                                               | n7      | 5, 10, 15, 20, 25, 30, 40, 50                |                           |
| CA_n1A-n3A-n7B       | -                                                             | n1      | 5, 10, 15, 20                                | 0                         |
|                      |                                                               | n3      | 5, 10, 15, 20, 25, 30                        |                           |
|                      |                                                               | n7      | CA_n7B_BCS0                                  |                           |
|                      | CA_n1A-n3A<br>CA_n1A-n7A<br>CA_n3A-n7A<br>CA_n7B              | n1      | 5, 10, 15, 20, 25, 30, 40, 50                | 1                         |
|                      |                                                               | n3      | 5, 10, 15, 20, 25, 30, 40, 50                |                           |
|                      |                                                               | n7      | CA_n7B_BCS0                                  |                           |
| CA_n1A-n3B-n7A       | -                                                             | n1      | 5, 10, 15, 20, 25, 30, 40, 50                | 0                         |
|                      |                                                               | n3      | CA_n3B_BCS0                                  |                           |
|                      |                                                               | n7      | 5, 10, 15, 20, 25, 30, 40, 50                |                           |
| CA_n1A-n3(2A)-n7A    | -                                                             | n1      | 5, 10, 15, 20, 25, 30, 40, 50                | 0                         |
|                      |                                                               | n3      | CA_n3(2A)_BCS1                               |                           |
|                      |                                                               | n7      | 5, 10, 15, 20, 25, 30, 40, 50                |                           |
| CA_n1(2A)-n3A-n7A    | -                                                             | n1      | CA_n1(2A)_BCS0                               | 0                         |
|                      |                                                               | n3      | 5, 10, 15, 20, 25, 30, 40, 50                |                           |
|                      |                                                               | n7      | 5, 10, 15, 20, 25, 30, 40, 50                |                           |
| CA_n1(2A)-n3B-n7A    | -                                                             | n1      | CA_n1(2A)_BCS0                               | 0                         |
|                      |                                                               | n3      | CA_n3B_BCS0                                  |                           |
|                      |                                                               | n7      | 5, 10, 15, 20, 25, 30, 40, 50                |                           |
| CA_n1(2A)-n3(2A)-n7A | -                                                             | n1      | CA_n1(2A)_BCS0                               | 0                         |
|                      |                                                               | n3      | CA_n3(2A)_BCS1                               |                           |
|                      |                                                               | n7      | 5, 10, 15, 20, 25, 30, 40, 50                |                           |
| CA_n1A-n3A-n8A       | -                                                             | n1      | 5, 10, 15, 20                                | 0                         |
|                      |                                                               | n3      | 5, 10, 15, 20, 25, 30                        |                           |
|                      |                                                               | n8      | 5, 10, 15, 20                                |                           |
| CA_n1A-n3A-n18A      | CA_n1A-n3A<br>CA_n1A-n18A<br>CA_n3A-n18A                      | n1      | 5, 10, 15, 20, 25, 30, 40, 50                | 0                         |
|                      |                                                               | n3      | 5, 10, 15, 20, 25, 30, 40                    |                           |
|                      |                                                               | n18     | 5, 10, 15                                    |                           |
| CA_n1A-n3A-n20A      | CA_n1A-n3A<br>CA_n1A-n20A<br>CA_n3A-n20A                      | n1      | 5, 10, 15, 20, 25, 30, 40, 50                | 0                         |
|                      |                                                               | n3      | 5, 10, 15, 20, 25, 30, 40                    |                           |
|                      |                                                               | n20     | 5, 10, 15, 20                                |                           |
| CA_n1A-n3A-n28A      | -                                                             | n1      | 5, 10, 15, 20                                | 0                         |
|                      |                                                               | n3      | 5, 10, 15, 20, 25, 30                        |                           |
|                      |                                                               | n28     | 5, 10, 15, 20 <sup>2</sup>                   |                           |
|                      | CA_n1A-n3A<br>CA_n1A-n28A<br>CA_n3A-n28A                      | n1      | 5, 10, 15, 20                                | 1                         |
|                      |                                                               | n3      | 5, 10, 15, 20, 25, 30, 40                    |                           |
|                      |                                                               | n28     | 5, 10, 15, 20                                |                           |
|                      |                                                               | n1      | 5, 10, 15, 20, 25, 30, 40, 50                | 2                         |
|                      |                                                               | n3      | 5, 10, 15, 20, 25, 30, 40, 50                |                           |
|                      |                                                               | n28     | 5, 10, 15, 20 <sup>1</sup> , 30 <sup>1</sup> |                           |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>6</sup>      | NR Band | Channel bandwidth (MHz) (NOTE 3)        | Bandwidth combination set |
|---------------------|--------------------------------------------------------------------|---------|-----------------------------------------|---------------------------|
| CA_n1A-n3A-n41A     | CA_n1A-n3A<br>CA_n1A-n41A<br>CA_n3A-n41A                           | n1      | 5, 10, 15, 20                           | 0                         |
|                     |                                                                    | n3      | 5, 10, 15, 20, 25, 30                   |                           |
|                     |                                                                    | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100 |                           |
| CA_n1A-n3A-n67A     | CA_n1A-n3A                                                         | n1      | 5, 10, 15, 20, 25, 30, 40, 50           | 0                         |
|                     |                                                                    | n3      | 5, 10, 15, 20, 25, 30, 40               |                           |
|                     |                                                                    | n67     | 5, 10, 15, 20                           |                           |
| CA_n1A-n3A-n77A     | CA_n1A-n3A<br>CA_n1A-n77A<br>CA_n3A-n77A                           | n1      | 5, 10, 15, 20                           | 0                         |
|                     |                                                                    | n3      | 5, 10, 15, 20, 25, 30                   |                           |
|                     |                                                                    | n77     | 10, 15, 20, 40, 50, 60, 80, 90, 100     |                           |
|                     |                                                                    | n1      | 5, 10, 15, 20, 25, 30, 40, 50           | 1                         |
|                     |                                                                    | n3      | 5, 10, 15, 20, 25, 30, 40               |                           |
|                     |                                                                    | n77     | 10, 15, 20, 40, 50, 60, 80, 90, 100     |                           |
| CA_n1A-n3A-n77(2A)  | CA_n1A-n3A<br>CA_n1A-n77A<br>CA_n3A-n77A                           | n1      | 5, 10, 15, 20                           | 0                         |
|                     |                                                                    | n3      | 5, 10, 15, 20, 25, 30                   |                           |
|                     |                                                                    | n77     | CA_n77(2A)_BCS1                         |                           |
| CA_n1A-n3A-n78A     | CA_n1A-n3A<br>CA_n1A-n78A <sup>7</sup><br>CA_n3A-n78A <sup>7</sup> | n1      | 5, 10, 15, 20                           | 0                         |
|                     |                                                                    | n3      | 5, 10, 15, 20, 25, 30                   |                           |
|                     |                                                                    | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100     |                           |
|                     |                                                                    | n1      | 5, 10, 15, 20, 25, 30, 40, 50           | 1                         |
|                     |                                                                    | n3      | 5, 10, 15, 20, 25, 30, 40               |                           |
|                     |                                                                    | n78     | 10, 15, 20, 40, 50, 60, 70, 80, 90, 100 | 2                         |
|                     |                                                                    | n1      | 5, 10, 15, 20                           |                           |
|                     |                                                                    | n3      | 5, 10, 15, 20, 25, 30, 40               |                           |
| CA_n1A-n3A-n78(2A)  | CA_n1A-n3A<br>CA_n1A-n78A<br>CA_n3A-n78A                           | n1      | 5, 10, 15, 20                           | 0                         |
|                     |                                                                    | n3      | 5, 10, 15, 20, 25, 30, 40               |                           |
|                     |                                                                    | n78     | CA_n78(2A)_BCS2                         |                           |
| CA_n1A-n3A-n79A     | CA_n1A-n3A<br>CA_n1A-n79A<br>CA_n3A-n79A                           | n1      | 5, 10, 15, 20                           | 0                         |
|                     |                                                                    | n3      | 5, 10, 15, 20, 25, 30                   |                           |
|                     |                                                                    | n79     | 40, 50, 60, 80, 100                     |                           |
| CA_n1A-n5A-n7A      | CA_n1A-n5A<br>CA_n1A-n7A<br>CA_n5A-n7A                             | n1      | 5, 10, 15, 20, 25, 30, 40, 50           | 0                         |
|                     |                                                                    | n5      | 5, 10, 15, 20                           |                           |
|                     |                                                                    | n7      | 5, 10, 15, 20, 25, 30, 40, 50           |                           |
| CA_n1A-n5A-n7B      | CA_n1A-n5A<br>CA_n1A-n7A<br>CA_n5A-n7A<br>CA_n7B                   | n1      | 5, 10, 15, 20, 25, 30, 40, 50           | 0                         |
|                     |                                                                    | n5      | 5, 10, 15, 20                           |                           |
|                     |                                                                    | n7      | CA_n7B_BCS0                             |                           |
| CA_n1A-n5A-n28A     | -                                                                  | n1      | 5, 10, 15, 20, 25, 30, 40, 50           | 0                         |
|                     |                                                                    | n5      | 5, 10, 15, 20                           |                           |
|                     |                                                                    | n28     | 5, 10, 15, 20, 30                       |                           |
| CA_n1A-n5A-n78A     | CA_n1A-n5A<br>CA_n1A-n78A<br>CA_n5A-n78A                           | n1      | 5, 10, 15, 20, 25, 30, 40, 50           | 0                         |
|                     |                                                                    | n5      | 5, 10, 15, 20                           |                           |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                              | Bandwidth combination set |
|---------------------|---------------------------------------------------------------|---------|---------------------------------------------------------------|---------------------------|
|                     |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70 <sup>4</sup> , 80, 90, 100 |                           |
| CA_n1A-n7A-n8A      | CA_n1A-n7A<br>CA_n1A-n8A<br>CA_n7A-n8A                        | n1      | 5, 10, 15, 20, 25, 30, 40                                     | 0                         |
|                     |                                                               | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                 |                           |
|                     |                                                               | n8      | 5, 10, 15, 20                                                 |                           |
| CA_n1A-n7A-n40A     | CA_n1A-n7A<br>CA_n1A-n40A<br>CA_n7A-n40A                      | n1      | 5, 10, 15, 20, 25, 30, 40, 50                                 | 0                         |
|                     |                                                               | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                 |                           |
|                     |                                                               | n40     | 5, 10, 15, 20, 25, 30, 40, 50, 60, 80                         |                           |
| CA_n1A-n7A-n79A     | -                                                             | n1      | 5, 10, 15, 20, 25, 30, 40, 50                                 | 0                         |
|                     |                                                               | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                 |                           |
|                     |                                                               | n79     | 40, 50, 60, 80, 100                                           |                           |
| CA_n1A-n7A-n79C     | -                                                             | n1      | 5, 10, 15, 20, 25, 30, 40, 50                                 | 0                         |
|                     |                                                               | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                 |                           |
|                     |                                                               | n79     | CA_n79C_BCS0                                                  |                           |
| CA_n1(2A)-n7A-n79A  | -                                                             | n1      | CA_n1(2A)_BCS0                                                | 0                         |
|                     |                                                               | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                 |                           |
|                     |                                                               | n79     | 40, 50, 60, 80, 100                                           |                           |
| CA_n1(2A)-n7A-n79C  | -                                                             | n1      | CA_n1(2A)_BCS0                                                | 0                         |
|                     |                                                               | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                 |                           |
|                     |                                                               | n79     | CA_n79C_BCS0                                                  |                           |
| CA_n1A-n8A-n28A     | -                                                             | n1      | 5, 10, 15, 20, 25, 30, 40, 50                                 | 0                         |
|                     |                                                               | n8      | 5, 10, 15, 20                                                 |                           |
|                     |                                                               | n28     | 10, 15, 20                                                    |                           |
| CA_n1A-n8A-n40A     | CA_n1A-n8A<br>CA_n1A-n40A<br>CA_n8A-n40A                      | n1      | 5, 10, 15, 20, 25, 30, 40, 50                                 | 0                         |
|                     |                                                               | n8      | 5, 10, 15, 20                                                 |                           |
|                     |                                                               | n40     | 5, 10, 15, 20, 25, 30, 40, 50, 60, 80                         |                           |
| CA_n1A-n8A-n77A     | -                                                             | n1      | 5, 10, 15, 20                                                 | 0                         |
|                     |                                                               | n8      | 5, 10, 15, 20                                                 |                           |
|                     |                                                               | n77     | 10, 15, 20, 40, 50, 60, 80, 90, 100                           |                           |
| CA_n1A-n8A-n77(2A)  | -                                                             | n1      | 5, 10, 15, 20                                                 | 0                         |
|                     |                                                               | n8      | 5, 10, 15, 20                                                 |                           |
|                     |                                                               | n77     | CA_n77(2A)_BCS1                                               |                           |
| CA_n1A-n7A-n28A     | CA_n1A-n7A<br>CA_n1A-n28A<br>CA_n7A-n28A                      | n1      | 5, 10, 15, 20                                                 | 0                         |
|                     |                                                               | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                 |                           |
|                     |                                                               | n28     | 5, 10, 15, 20                                                 |                           |
| CA_n1A-n7B-n28A     | CA_n1A-n28A<br>CA_n1A-n7A<br>CA_n7A-n28A<br>CA_n7B            | n1      | 5, 10, 15, 20                                                 | 0                         |
|                     |                                                               | n7      | CA_n7B_BCS0                                                   |                           |
|                     |                                                               | n28     | 5, 10, 15, 20                                                 |                           |
| CA_n1A-n7A-n78A     | CA_n1A-n7A<br>CA_n1A-n78A<br>CA_n7A-n78A                      | n1      | 5, 10, 15, 20                                                 | 0                         |
|                     |                                                               | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                 |                           |
|                     |                                                               | n78     | 10, 15, 20, 40, 50, 60, 80, 90 <sup>1</sup> , 100             |                           |
|                     |                                                               | n1      | 5, 10, 15, 20                                                 | 1                         |
|                     |                                                               | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                 |                           |
| CA_n1A-n7B-n78A     | CA_n1A-n78A                                                   | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90 <sup>1</sup> , 100 | 0                         |
|                     |                                                               | n1      | 5, 10, 15, 20                                                 |                           |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                              | Bandwidth combination set |
|---------------------|---------------------------------------------------------------|---------|---------------------------------------------------------------|---------------------------|
|                     | CA_n1A-n7A<br>CA_n7A-n78A<br>CA_n7B                           |         |                                                               |                           |
|                     |                                                               | n7      | CA_n7B_BCS0                                                   |                           |
|                     |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70 <sup>4</sup> , 80, 90, 100 |                           |
| CA_n1A-n7A-n78(2A)  | CA_n1A-n7A<br>CA_n1A-n78A<br>CA_n7A-n78A                      | n1      | 5, 10, 15, 20                                                 | 0                         |
|                     |                                                               | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                 |                           |
|                     |                                                               | n78     | CA_n78(2A)_BCS0                                               |                           |
|                     |                                                               | n1      | 5, 10, 15, 20                                                 | 1                         |
|                     |                                                               | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                 |                           |
|                     |                                                               | n78     | CA_n78(2A)_BCS2                                               |                           |
| CA_n1A-n8A-n78A     | CA_n1A-n8A<br>CA_n1A-n78A<br>CA_n8A-n78A                      | n1      | 5, 10, 15, 20                                                 | 0                         |
|                     |                                                               | n8      | 5, 10, 15, 20                                                 |                           |
|                     |                                                               | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100                           |                           |
|                     | -                                                             | n1      | 5, 10, 15, 20                                                 | 1                         |
|                     |                                                               | n8      | 5, 10, 15, 20                                                 |                           |
|                     |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100                   |                           |
| CA_n1A-n8A-n78(2A)  | -                                                             | n1      | 5, 10, 15, 20                                                 | 0                         |
|                     |                                                               | n8      | 5, 10, 15, 20                                                 |                           |
|                     |                                                               | n78     | CA_n78(2A)_BCS1                                               |                           |
| CA_n1A-n8A-n79A     | -                                                             | n1      | 5, 10, 15, 20                                                 | 0                         |
|                     |                                                               | n8      | 5, 10, 15, 20                                                 |                           |
|                     |                                                               | n79     | 40, 50, 60, 80, 100                                           |                           |
| CA_n1A-n18A-n28A    | CA_n1A-n18A<br>CA_n1A-n28A<br>CA_n18A-n28A                    | n1      | 5, 10, 15, 20, 25, 30, 40, 50                                 | 0                         |
|                     |                                                               | n18     | 5, 10, 15                                                     |                           |
|                     |                                                               | n28     | 5, 10                                                         |                           |
| CA_n1A-n18A-n41A    | CA_n1A-n18A<br>CA_n1A-n41A<br>CA_n18A-n41A                    | n1      | 5, 10, 15, 20, 25, 30, 40, 50                                 | 0                         |
|                     |                                                               | n18     | 5, 10, 15                                                     |                           |
|                     |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100                       |                           |
| CA_n1A-n18A-n77A    | CA_n1A-n18A<br>CA_n1A-n77A<br>CA_n18A-n77A                    | n1      | 5, 10, 15, 20, 25, 30, 40, 50                                 | 0                         |
|                     |                                                               | n18     | 5, 10, 15                                                     |                           |
|                     |                                                               | n77     | 10, 15, 20, 40, 50, 60, 80, 90, 100                           |                           |
| CA_n1A-n18A-n77(2A) | CA_n1A-n18A<br>CA_n1A-n77A<br>CA_n18A-n77A                    | n1      | 5, 10, 15, 20                                                 | 0                         |
|                     |                                                               | n18     | 5, 10, 15                                                     |                           |
|                     |                                                               | n77     | CA_n77(2A)_BCS1                                               |                           |
| CA_n1A-n20A-n67A    | CA_n1A-n20A                                                   | n1      | 5, 10, 15, 20, 25, 30, 40, 50                                 | 0                         |
|                     |                                                               | n20     | 5, 10, 15, 20                                                 |                           |
|                     |                                                               | n67     | 5, 10, 15, 20                                                 |                           |
| CA_n1A-n20A-n78A    | -                                                             | n1      | 5, 10, 15, 20, 25, 30, 40, 50                                 | 0                         |
|                     |                                                               | n20     | 5, 10, 15, 20                                                 |                           |
|                     |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100               |                           |
| CA_n1A-n28A-n38A    | -                                                             | n1      | 5, 10, 15, 20, 25, 30, 40, 50                                 | 0                         |
|                     |                                                               | n28     | 5, 10, 15, 20, 30                                             |                           |
|                     |                                                               | n38     | 5, 10, 15, 20, 25, 30, 40                                     |                           |
| CA_n1A-n28A-n40A    | -                                                             | n1      | 5, 10, 15, 20                                                 | 0                         |
|                     |                                                               | n28     | 5, 10, 15, 20                                                 |                           |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|---------------------|---------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
|                     |                                                               | n40     | 5, 10, 15, 20, 25, 30, 40, 50, 60, 80           |                           |
| CA_n1A-n28A-n40B    | -                                                             | n1      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                               | n28     | 5, 10, 15, 20                                   |                           |
|                     |                                                               | n40     | CA_n40B_BCS0                                    |                           |
| CA_n1A-n28A-n41A    | CA_n1A-n28A<br>CA_n1A-n41A<br>CA_n28A-n41A                    | n1      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                               | n28     | 5, 10, 15, 20                                   |                           |
|                     |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100         |                           |
| CA_n1A-n28A-n77A    | CA_n1A-n28A<br>CA_n1A-n77A<br>CA_n28A-n77A                    | n1      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                               | n28     | 5, 10, 15, 20                                   |                           |
|                     |                                                               | n77     | 10, 15, 20, 40, 50, 60, 80, 90, 100             |                           |
| CA_n1A-n28A-n77(2A) | CA_n1A-n28A<br>CA_n1A-n77A<br>CA_n28A-n77A                    | n1      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                               | n28     | 5, 10, 15, 20                                   |                           |
|                     |                                                               | n77     | CA_n77(2A)_BCS0                                 |                           |
|                     |                                                               | n1      | 5, 10, 15, 20                                   | 1                         |
|                     |                                                               | n28     | 5, 10                                           |                           |
| CA_n1A-n28A-n78A    | CA_n1A-n28A<br>CA_n1A-n78A<br>CA_n28A-n78A                    | n77     | CA_n77(2A)_BCS1                                 |                           |
|                     |                                                               | n1      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                               | n28     | 5, 10, 15, 20 <sup>2</sup>                      |                           |
|                     |                                                               | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100             |                           |
|                     |                                                               | n1      | 5, 10, 15, 20                                   | 1                         |
|                     |                                                               | n28     | 5, 10, 15, 20                                   |                           |
|                     |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                     |                                                               | n1      | 5, 10, 15, 20, 25, 30, 40, 50                   | 2                         |
|                     |                                                               | n28     | 5, 10, 15, 20, 30                               |                           |
| CA_n1A-n28A-n78(2A) | CA_n1A-n28A<br>CA_n1A-n78A<br>CA_n28A-n78A                    | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                     |                                                               | n1      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                               | n28     | 5, 10, 15, 20                                   |                           |
| CA_n1A-n28A-n79A    | CA_n1A-n28A<br>CA_n1A-n79A<br>CA_n28A-n79A                    | n78     | CA_n78(2A)_BCS2                                 |                           |
|                     |                                                               | n1      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                               | n28     | 5, 10, 15, 20                                   |                           |
| CA_n1A-n38A-n78A    | -                                                             | n79     | 40, 50, 60, 80, 100                             |                           |
|                     |                                                               | n1      | 5, 10, 15, 20, 25, 30, 40, 50                   | 0                         |
|                     |                                                               | n38     | 5, 10, 15, 20, 25, 30, 40                       |                           |
| CA_n1A-n40A-n78A    | CA_n1A-n40A<br>CA_n1A-n78A<br>CA_n40A-n78A                    | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                     |                                                               | n1      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                               | n40     | 5, 10, 15, 20, 25, 30, 40, 50                   |                           |
|                     | CA_n1A-n40A<br>CA_n1A-n78A<br>CA_n40A-n78A                    | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100             |                           |
|                     |                                                               | n1      | 5, 10, 15, 20                                   | 1                         |
|                     |                                                               | n40     | 5, 10, 15, 20, 25, 30, 40, 50, 60, 80           |                           |
|                     |                                                               | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100             |                           |
|                     | CA_n1A-n40A<br>CA_n1A-n78A<br>CA_n40A-n78A                    | n1      | 5, 10, 15, 20                                   | 2                         |
|                     |                                                               |         |                                                 |                           |

| NR CA configuration              | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                                                                                                        | Bandwidth combination set |
|----------------------------------|---------------------------------------------------------------|---------|-----------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
|                                  |                                                               | n40     | 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                      |                           |
|                                  |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                         |                           |
| CA_n1A-n40B-n78A                 | -                                                             | n1      | 5, 10, 15, 20                                                                                                                           | 0                         |
|                                  |                                                               | n40     | CA_n40B_BCS0                                                                                                                            |                           |
|                                  |                                                               | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100                                                                                                     |                           |
| CA_n1A-n41A-n77A                 | CA_n1A-n41A<br>CA_n1A-n77A<br>CA_n41A-n77A                    | n1      | 5, 10, 15, 20                                                                                                                           | 0                         |
|                                  |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100                                                                                                 |                           |
|                                  |                                                               | n77     | 10, 15, 20, 40, 50, 60, 80, 90, 100                                                                                                     |                           |
| CA_n1A-n41A-n77(2A)              | CA_n1A-n41A<br>CA_n1A-n77A<br>CA_n41A-n77A                    | n1      | 5, 10, 15, 20                                                                                                                           | 0                         |
|                                  |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100                                                                                                 |                           |
|                                  |                                                               | n77     | CA_n77(2A)_BCS1                                                                                                                         |                           |
| CA_n1A-n77A-n79A <sup>4</sup>    | CA_n1A-n77A<br>CA_n1A-n79A<br>CA_n77A-n79A                    | n1      | 5, 10, 15, 20                                                                                                                           | 0                         |
|                                  |                                                               | n77     | 10, 15, 20, 40, 50, 60, 80, 90, 100                                                                                                     |                           |
|                                  |                                                               | n79     | 40, 50, 60, 80, 100                                                                                                                     |                           |
| CA_n1A-n77(2A)-n79A <sup>4</sup> | CA_n1A-n77A<br>CA_n1A-n79A<br>CA_n77A-n79A                    | n1      | 5, 10, 15, 20                                                                                                                           | 0                         |
|                                  |                                                               | n77     | CA_n77(2A)_BCS0                                                                                                                         |                           |
|                                  |                                                               | n79     | 40, 50, 60, 80, 100                                                                                                                     |                           |
| CA_n1A-n78A-n79A <sup>5</sup>    | CA_n1A-n78A<br>CA_n1A-n79A<br>CA_n78A-n79A                    | n1      | 5, 10, 15, 20                                                                                                                           | 0                         |
|                                  |                                                               | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100                                                                                                     |                           |
|                                  |                                                               | n79     | 40, 50, 60, 80, 100                                                                                                                     |                           |
|                                  |                                                               | n1      | 5, 10, 15, 20                                                                                                                           | 1                         |
|                                  |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100                                                                                             |                           |
|                                  |                                                               | n79     | 40, 50, 60, 80, 100                                                                                                                     |                           |
| CA_n1A-n78(2A)-n79A              | -                                                             | n1      | 5, 10, 15, 20                                                                                                                           | 0                         |
|                                  |                                                               | n78     | CA_n78(2A)_BCS1                                                                                                                         |                           |
|                                  |                                                               | n79     | 40, 50, 60, 80, 100                                                                                                                     |                           |
| CA_n2A-n5A-n30A                  | CA_n2A-n5A<br>CA_n2A-n30A<br>CA_n5A-n30A                      | n2      | 5, 10, 15, 20                                                                                                                           | 0                         |
|                                  |                                                               | n5      | 5, 10, 15, 20                                                                                                                           |                           |
|                                  |                                                               | n30     | 5, 10                                                                                                                                   |                           |
| CA_n2A-n5A-n48A                  | CA_n2A-n5A<br>CA_n2A-n48A<br>CA_n5A-n48A                      | n2      | 5, 10, 15, 20                                                                                                                           | 0                         |
|                                  |                                                               | n5      | 5, 10, 15, 20                                                                                                                           |                           |
|                                  |                                                               | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> |                           |
| CA_n2A-n5A-n48B                  | CA_n2A-n5A<br>CA_n2A-n48A<br>CA_n5A-n48A                      | n2      | 5, 10, 15, 20                                                                                                                           | 0                         |
|                                  |                                                               | n5      | 5, 10, 15, 20                                                                                                                           |                           |
|                                  |                                                               | n48     | CA_n48B_BCS0                                                                                                                            |                           |
|                                  |                                                               | n2      | 5, 10, 15, 20                                                                                                                           | 1                         |
|                                  |                                                               | n5      | 5, 10, 15, 20                                                                                                                           |                           |
|                                  |                                                               | n48     | CA_n48B_BCS1                                                                                                                            | 2                         |
|                                  |                                                               | n2      | 5, 10, 15, 20                                                                                                                           |                           |
|                                  |                                                               | n5      | 5, 10, 15, 20                                                                                                                           |                           |
|                                  |                                                               | n48     | CA_n48B_BCS2                                                                                                                            |                           |

| NR CA configuration   | Uplink CA configuration or single uplink carrier <sup>6</sup>                             | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|-----------------------|-------------------------------------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
| CA_n2A-n5A-n48(2A)    | CA_n2A-n5A<br>CA_n2A-n48A<br>CA_n5A-n48A                                                  | n2      | 5, 10, 15, 20                                   | 0                         |
|                       |                                                                                           | n5      | 5, 10, 15, 20                                   |                           |
|                       |                                                                                           | n48     | CA_n48(2A)_BCS0                                 |                           |
|                       |                                                                                           | n2      | 5, 10, 15, 20                                   | 1                         |
|                       |                                                                                           | n5      | 5, 10, 15, 20                                   |                           |
|                       |                                                                                           | n48     | CA_n48(2A)_BCS1                                 |                           |
| CA_n2A-n5A-n48(A-B)   | CA_n2A-n5A<br>CA_n2A-n48A<br>CA_n5A-n48A                                                  | n2      | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                       |                                                                                           | n5      | 5, 10, 15, 20, 25 <sup>1</sup>                  |                           |
|                       |                                                                                           | n48     | CA_n48(A-B)_BCS0                                |                           |
|                       |                                                                                           | n2      | 5, 10, 15, 20, 25, 30, 40                       | 1                         |
|                       |                                                                                           | n5      | 5, 10, 15, 20, 25 <sup>1</sup>                  |                           |
|                       |                                                                                           | n48     | CA_n48(A-B)_BCS1                                |                           |
| CA_n2(2A)-n5A-n30A    | CA_n2A-n5A<br>CA_n2A-n30A<br>CA_n5A-n30A                                                  | n2      | CA_n2(2A)_BCS0                                  | 0                         |
|                       |                                                                                           | n5      | 5, 10, 15, 20                                   |                           |
|                       |                                                                                           | n30     | 5, 10                                           |                           |
| CA_n2A-n5A-n66A       | CA_n2A-n5A<br>CA_n2A-n66A<br>CA_n5A-n66A                                                  | n2      | 5, 10, 15, 20                                   | 0                         |
|                       |                                                                                           | n5      | 5, 10, 15, 20                                   |                           |
|                       |                                                                                           | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
| CA_n2(2A)-n5A-n66A    | CA_n2A-n5A<br>CA_n2A-n66A<br>CA_n5A-n66A                                                  | n2      | CA_n2(2A)_BCS0                                  | 0                         |
|                       |                                                                                           | n5      | 5, 10, 15, 20                                   |                           |
|                       |                                                                                           | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
| CA_n2(2A)-n5A-n66(2A) | CA_n2A-n5A<br>CA_n2A-n66A<br>CA_n5A-n66A                                                  | n2      | CA_n2(2A)_BCS0                                  | 0                         |
|                       |                                                                                           | n5      | 5, 10, 15, 20                                   |                           |
|                       |                                                                                           | n66     | CA_n66(2A)_BCS1                                 |                           |
| CA_n2A-n5A-n66(2A)    | CA_n2A-n5A<br>CA_n2A-n66A<br>CA_n5A-n66A                                                  | n2      | 5, 10, 15, 20                                   | 0                         |
|                       |                                                                                           | n5      | 5, 10, 15, 20                                   |                           |
|                       |                                                                                           | n66     | CA_n66(2A)_BCS0                                 |                           |
| CA_n2A-n5A-n66(3A)    | CA_n2A-n5A<br>CA_n2A-n66A<br>CA_n5A-n66A                                                  | n2      | 5, 10, 15, 20                                   | 0                         |
|                       |                                                                                           | n5      | 5, 10, 15, 20                                   |                           |
|                       |                                                                                           | n66     | CA_n66(3A)_BCS0                                 |                           |
| CA_n2A-n5A-n77A       | n77 <sup>7, 9</sup><br>CA_n2A-n5A<br>CA_n2A-n77A <sup>7</sup><br>CA_n5A-n77A <sup>7</sup> | n2      | 5, 10, 15, 20                                   | 0                         |
|                       |                                                                                           | n5      | 5, 10, 15, 20                                   |                           |
|                       |                                                                                           | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n2A-n5A-n77C       | CA_n2A-n5A<br>CA_n2A-n77A<br>CA_n5A-n77A                                                  | n2      | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                       |                                                                                           | n5      | 5, 10, 15, 20, 25 <sup>1</sup>                  |                           |
|                       |                                                                                           | n77     | CA_n77C_BCS0                                    |                           |
|                       |                                                                                           | n2      | 5, 10, 15, 20, 25, 30, 40                       | 1                         |
|                       |                                                                                           | n5      | 5, 10, 15, 20, 25 <sup>1</sup>                  |                           |
|                       |                                                                                           | n77     | CA_n77C_BCS1                                    |                           |
| CA_n2A-n5A-n77(2A)    | n77 <sup>7</sup><br>CA_n2A-n5A                                                            | n2      | 5, 10, 15, 20                                   | 0                         |



| NR CA configuration    | Uplink CA configuration or single uplink carrier <sup>6</sup>                            | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|------------------------|------------------------------------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
|                        | CA_n2A-n77A <sup>7</sup><br>CA_n5A-n77A <sup>7</sup>                                     |         |                                                 |                           |
|                        |                                                                                          | n5      | 5, 10, 15, 20                                   |                           |
|                        |                                                                                          | n77     | CA_n77(2A)_BCS1                                 |                           |
| CA_n2(2A)-n5A-n77A     | n77 <sup>7</sup><br>CA_n2A-n5A<br>CA_n2A-n77A <sup>7</sup><br>CA_n5A-n77A <sup>7</sup>   | n2      | CA_n2(2A)_BCS0                                  | 0                         |
|                        |                                                                                          | n5      | 5, 10, 15, 20                                   |                           |
|                        |                                                                                          | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n2A-n12A-n30A       | CA_n2A-n12A<br>CA_n2A-n30A<br>CA_n12A-n30A                                               | n2      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                                                          | n12     | 5, 10, 15                                       |                           |
|                        |                                                                                          | n30     | 5, 10                                           |                           |
| CA_n2(2A)-n12A-n30A    | CA_n2A-n12A<br>CA_n2A-n30A<br>CA_n12A-n30A                                               | n2      | CA_n2(2A)_BCS0                                  | 0                         |
|                        |                                                                                          | n12     | 5, 10, 15                                       |                           |
|                        |                                                                                          | n30     | 5, 10                                           |                           |
| CA_n2A-n12A-n66A       | CA_n2A-n12A<br>CA_n2A-n66A<br>CA_n12A-n66A                                               | n2      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                                                          | n12     | 5, 10, 15                                       |                           |
|                        |                                                                                          | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
| CA_n2(2A)-n12A-n66A    | CA_n2A-n12A<br>CA_n2A-n66A<br>CA_n12A-n66A                                               | n2      | CA_n2(2A)_BCS0                                  | 0                         |
|                        |                                                                                          | n12     | 5, 10, 15                                       |                           |
|                        |                                                                                          | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
| CA_n2A-n12A-n66(2A)    | CA_n2A-n12A<br>CA_n2A-n66A<br>CA_n12A-n66A                                               | n2      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                                                          | n12     | 5, 10, 15                                       |                           |
|                        |                                                                                          | n66     | CA_n66(2A)_BCS1                                 |                           |
| CA_n2(2A)-n12A-n66(2A) | CA_n2A-n12A<br>CA_n2A-n66A<br>CA_n12A-n66A                                               | n2      | CA_n2(2A)_BCS0                                  | 0                         |
|                        |                                                                                          | n12     | 5, 10, 15                                       |                           |
|                        |                                                                                          | n66     | CA_n66(2A)_BCS1                                 |                           |
| CA_n2A-n12A-n66(3A)    | CA_n2A-n12A<br>CA_n2A-n66A<br>CA_n12A-n66A                                               | n2      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                                                          | n12     | 5, 10, 15                                       |                           |
|                        |                                                                                          | n66     | CA_n66(3A)_BCS0                                 |                           |
| CA_n2A-n12A-n77A       | n77 <sup>7</sup><br>CA_n2A-n12A<br>CA_n2A-n77A <sup>7</sup><br>CA_n12A-n77A <sup>7</sup> | n2      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                                                          | n12     | 5, 10, 15                                       |                           |
|                        |                                                                                          | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n2(2A)-n12A-n77A    | n77 <sup>7</sup><br>CA_n2A-n12A<br>CA_n2A-n77A <sup>7</sup><br>CA_n12A-n77A <sup>7</sup> | n2      | CA_n2(2A)_BCS0                                  | 0                         |
|                        |                                                                                          | n12     | 5, 10, 15                                       |                           |
|                        |                                                                                          | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n2A-n12A-n77(2A)    | n77 <sup>7</sup><br>CA_n2A-n12A<br>CA_n2A-n77A <sup>7</sup>                              | n2      | 5, 10, 15, 20                                   | 0                         |

| NR CA configuration    | Uplink CA configuration or single uplink carrier <sup>6</sup>                            | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|------------------------|------------------------------------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
|                        | CA_n12A-n77A <sup>7</sup>                                                                |         |                                                 |                           |
|                        |                                                                                          | n12     | 5, 10, 15                                       |                           |
|                        |                                                                                          | n77     | CA_n77(2A)_BCS1                                 |                           |
| CA_n2A-n14A-n30A       | CA_n2A-n14A<br>CA_n2A-n30A<br>CA_n14A-n30A                                               | n2      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                                                          | n14     | 5, 10                                           |                           |
|                        |                                                                                          | n30     | 5, 10                                           |                           |
| CA_n2(2A)-n14A-n30A    | CA_n2A-n14A<br>CA_n2A-n30A<br>CA_n14A-n30A                                               | n2      | CA_n2(2A)_BCS0                                  | 0                         |
|                        |                                                                                          | n14     | 5, 10                                           |                           |
|                        |                                                                                          | n30     | 5, 10                                           |                           |
| CA_n2A-n14A-n66A       | CA_n2A-n14A<br>CA_n2A-n66A<br>CA_n14A-n66A                                               | n2      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                                                          | n14     | 5, 10                                           |                           |
|                        |                                                                                          | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
| CA_n2(2A)-n14A-n66A    | CA_n2A-n14A<br>CA_n2A-n66A<br>CA_n14A-n66A                                               | n2      | CA_n2(2A)_BCS0                                  | 0                         |
|                        |                                                                                          | n14     | 5, 10                                           |                           |
|                        |                                                                                          | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
| CA_n2(2A)-n14A-n66(2A) | CA_n2A-n14A<br>CA_n2A-n66A<br>CA_n14A-n66A                                               | n2      | CA_n2(2A)_BCS0                                  | 0                         |
|                        |                                                                                          | n14     | 5, 10                                           |                           |
|                        |                                                                                          | n66     | CA_n66(2A)_BCS1                                 |                           |
| CA_n2A-n14A-n66(2A)    | CA_n2A-n14A<br>CA_n2A-n66A<br>CA_n14A-n66A                                               | n2      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                                                          | n14     | 5, 10                                           |                           |
|                        |                                                                                          | n66     | CA_n66(2A)_BCS1                                 |                           |
| CA_n2A-n14A-n66(3A)    | CA_n2A-n14A<br>CA_n2A-n66A<br>CA_n14A-n66A                                               | n2      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                                                          | n14     | 5, 10                                           |                           |
|                        |                                                                                          | n66     | CA_n66(3A)_BCS0                                 |                           |
| CA_n2A-n14A-n77A       | n77 <sup>7</sup><br>CA_n2A-n14A<br>CA_n2A-n77A <sup>7</sup><br>CA_n14A-n77A <sup>7</sup> | n2      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                                                          | n14     | 5, 10                                           |                           |
|                        |                                                                                          | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n2A-n14A-n77(2A)    | n77 <sup>7</sup><br>CA_n2A-n14A<br>CA_n2A-n77A <sup>7</sup><br>CA_n14A-n77A <sup>7</sup> | n2      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                                                          | n14     | 5, 10                                           |                           |
|                        |                                                                                          | n77     | CA_n77(2A)_BCS1                                 |                           |
| CA_n2(2A)-n14A-n77A    | n77 <sup>7</sup><br>CA_n2A-n14A<br>CA_n2A-n77A <sup>7</sup><br>CA_n14A-n77A <sup>7</sup> | n2      | CA_n2(2A)_BCS0                                  | 0                         |
|                        |                                                                                          | n14     | 5, 10                                           |                           |
|                        |                                                                                          | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n2A-n29A-n30A       | CA_n2A-n30A                                                                              | n2      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                                                          | n29     | 5, 10                                           |                           |
|                        |                                                                                          | n30     | 5, 10                                           |                           |
| CA_n2(2A)-n29A-n30A    | CA_n2A-n30A                                                                              | n2      | CA_n2(2A)_BCS0                                  | 0                         |

| NR CA configuration    | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|------------------------|---------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
| CA_n2A-n29A-n66A       | CA_n2A-n66A                                                   | n29     | 5, 10                                           | 0                         |
|                        |                                                               | n30     | 5, 10                                           |                           |
|                        |                                                               | n2      | 5, 10, 15, 20                                   |                           |
| CA_n2(2A)-n29A-n66A    | CA_n2A-n66A                                                   | n29     | 5, 10                                           | 0                         |
|                        |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                        |                                                               | n2      | CA_n2(2A)_BCS0                                  |                           |
| CA_n2A-n29A-n66(2A)    | CA_n2A-n66A                                                   | n29     | 5, 10                                           | 0                         |
|                        |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                        |                                                               | n2      | 5, 10, 15, 20                                   |                           |
| CA_n2(2A)-n29A-n66(2A) | CA_n2A-n66A                                                   | n2      | CA_n2(2A)_BCS0                                  | 0                         |
|                        |                                                               | n29     | 5, 10                                           |                           |
|                        |                                                               | n66     | CA_n66(2A)_BCS1                                 |                           |
| CA_n2A-n29A-n77A       | n77 <sup>7</sup><br>CA_n2A-n77A <sup>7</sup>                  | n2      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                               | n29     | 5, 10                                           |                           |
|                        |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n2(2A)-n29A-n77A    | n77 <sup>7</sup><br>CA_n2A-n77A <sup>7</sup>                  | n2      | CA_n2(2A)_BCS0                                  | 0                         |
|                        |                                                               | n29     | 5, 10                                           |                           |
|                        |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n2A-n29A-n77(2A)    | n77 <sup>7</sup><br>CA_n2A-n77A <sup>7</sup>                  | n2      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                               | n29     | 5, 10                                           |                           |
|                        |                                                               | n77     | CA_n77(2A)_BCS1                                 |                           |
| CA_n2A-n30A-n66A       | CA_n2A-n30A<br>CA_n2A-n66A<br>CA_n30A-n66A                    | n2      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                               | n30     | 5, 10                                           |                           |
|                        |                                                               | n66     | 5, 10, 15, 20, 40                               |                           |
| CA_n2(2A)-n30A-n66A    | CA_n2A-n30A<br>CA_n2A-n66A<br>CA_n30A-n66A                    | n2      | CA_n2(2A)_BCS0                                  | 0                         |
|                        |                                                               | n30     | 5, 10                                           |                           |
|                        |                                                               | n66     | 5, 10, 15, 20, 40                               |                           |
| CA_n2(2A)-n30A-n66(2A) | CA_n2A-n30A<br>CA_n2A-n66A<br>CA_n30A-n66A                    | n2      | CA_n2(2A)_BCS0                                  | 0                         |
|                        |                                                               | n30     | 5, 10                                           |                           |
|                        |                                                               | n66     | CA_n66(2A)_BCS1                                 |                           |
| CA_n2A-n30A-n66(2A)    | CA_n2A-n30A<br>CA_n2A-n66A<br>CA_n30A-n66A                    | n2      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                               | n30     | 5, 10                                           |                           |
|                        |                                                               | n66     | CA_n66(2A)_BCS0                                 |                           |
| CA_n2A-n30A-n66(3A)    | CA_n2A-n30A<br>CA_n2A-n66A<br>CA_n30A-n66A                    | n2      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                               | n30     | 5, 10                                           |                           |
|                        |                                                               | n66     | CA_n66(3A)_BCS0                                 |                           |
| CA_n2A-n30A-n77A       | n77 <sup>7</sup><br>CA_n2A-n30A                               | n2      | 5, 10, 15, 20                                   | 0                         |

| NR CA configuration  | Uplink CA configuration or single uplink carrier <sup>6</sup>                            | NR Band | Channel bandwidth (MHz) (NOTE 3)                                                                                                        | Bandwidth combination set |
|----------------------|------------------------------------------------------------------------------------------|---------|-----------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
|                      | CA_n2A-n77A <sup>7</sup><br>CA_n30A-n77A <sup>7</sup>                                    |         |                                                                                                                                         |                           |
|                      |                                                                                          | n30     | 5, 10                                                                                                                                   |                           |
|                      |                                                                                          | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                         |                           |
| CA_n2A-n30A-n77(2A)  | n77 <sup>7</sup><br>CA_n2A-n30A<br>CA_n2A-n77A <sup>7</sup><br>CA_n30A-n77A <sup>7</sup> | n2      | 5, 10, 15, 20                                                                                                                           | 0                         |
|                      |                                                                                          | n30     | 5, 10                                                                                                                                   |                           |
|                      |                                                                                          | n77     | CA_n77(2A)_BCS1                                                                                                                         |                           |
| CA_n2(2A)-n30A-n77A  | n77 <sup>7</sup><br>CA_n2A-n30A<br>CA_n2A-n77A <sup>7</sup><br>CA_n30A-n77A <sup>7</sup> | n2      | CA_n2(2A)_BCS0                                                                                                                          | 0                         |
|                      |                                                                                          | n30     | 5, 10                                                                                                                                   |                           |
|                      |                                                                                          | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                         |                           |
| CA_n2A-n48A-n66A     | CA_n2A-n48A<br>CA_n2A-n66A<br>CA_n48A-n66A                                               | n2      | 5, 10, 15, 20                                                                                                                           | 0                         |
|                      |                                                                                          | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> |                           |
|                      |                                                                                          | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               |                           |
| CA_n2A-n48(A-B)-n66A | CA_n2A-n48A<br>CA_n2A-n66A<br>CA_n48A-n66A                                               | n2      | 5, 10, 15, 20, 25, 30, 40                                                                                                               | 0                         |
|                      |                                                                                          | n48     | CA_n48(A-B)_BCS0                                                                                                                        |                           |
|                      |                                                                                          | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               |                           |
|                      |                                                                                          | n2      | 5, 10, 15, 20, 25, 30, 40                                                                                                               | 1                         |
|                      |                                                                                          | n48     | CA_n48(A-B)_BCS1                                                                                                                        |                           |
|                      |                                                                                          | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               |                           |
| CA_n2A-n48B-n66A     | CA_n2A-n48A<br>CA_n2A-n66A<br>CA_n48A-n66A                                               | n2      | 5, 10, 15, 20                                                                                                                           | 0                         |
|                      |                                                                                          | n48     | CA_n48B_BCS0                                                                                                                            |                           |
|                      |                                                                                          | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               |                           |
|                      |                                                                                          | n2      | 5, 10, 15, 20                                                                                                                           | 1                         |
|                      |                                                                                          | n48     | CA_n48B_BCS1                                                                                                                            |                           |
|                      |                                                                                          | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               |                           |
|                      |                                                                                          | n2      | 5, 10, 15, 20                                                                                                                           | 2                         |
|                      |                                                                                          | n48     | CA_n48B_BCS2                                                                                                                            |                           |
| CA_n2A-n48(2A)-n66A  | CA_n2A-n48A<br>CA_n2A-n66A<br>CA_n48A-n66A                                               | n2      | 5, 10, 15, 20                                                                                                                           | 0                         |
|                      |                                                                                          | n48     | CA_n48(2A)_BCS0                                                                                                                         |                           |
|                      |                                                                                          | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               |                           |
|                      |                                                                                          | n2      | 5, 10, 15, 20                                                                                                                           | 1                         |
|                      |                                                                                          | n48     | CA_n48(2A)_BCS1                                                                                                                         |                           |
| CA_n2A-n48A-n77A     | n77 <sup>7, 9</sup><br>CA_n2A-n48A<br>CA_n2A-n77A                                        | n2      | 5, 10, 15, 20                                                                                                                           | 0                         |
|                      |                                                                                          | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> |                           |
|                      |                                                                                          | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                         |                           |
| CA_n2A-n48A-n77C     | CA_n2A-n48A<br>CA_n2A-n77A<br>CA_n77C                                                    | n2      | 5, 10, 15, 20, 25, 30, 40                                                                                                               | 0                         |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>6</sup>                               | NR Band | Channel bandwidth (MHz) (NOTE 3)                                                                                                        | Bandwidth combination set |
|---------------------|---------------------------------------------------------------------------------------------|---------|-----------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
|                     |                                                                                             | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> | 1                         |
|                     |                                                                                             | n77     | CA_n77C_BCS0                                                                                                                            |                           |
|                     |                                                                                             | n2      | 5, 10, 15, 20, 25, 30, 40                                                                                                               |                           |
|                     |                                                                                             | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> | 1                         |
|                     |                                                                                             | n77     | CA_n77C_BCS1                                                                                                                            |                           |
| CA_n2A-n48B-n77A    | CA_n2A-n48A<br>CA_n2A-n77A                                                                  | n2      | 5, 10, 15, 20                                                                                                                           | 0                         |
|                     |                                                                                             | n48     | CA_n48B_BCS0                                                                                                                            |                           |
|                     |                                                                                             | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                         |                           |
|                     |                                                                                             | n2      | 5, 10, 15, 20                                                                                                                           | 1                         |
|                     |                                                                                             | n48     | CA_n48B_BCS1                                                                                                                            |                           |
|                     |                                                                                             | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                         |                           |
|                     |                                                                                             | n2      | 5, 10, 15, 20                                                                                                                           | 2                         |
|                     |                                                                                             | n48     | CA_n48B_BCS2                                                                                                                            |                           |
| CA_n2A-n48(2A)-n77A | CA_n2A-n48A<br>CA_n2A-n77A                                                                  | n2      | 5, 10, 15, 20                                                                                                                           | 0                         |
|                     |                                                                                             | n48     | CA_n48(2A)_BCS0                                                                                                                         |                           |
|                     |                                                                                             | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                         |                           |
|                     |                                                                                             | n2      | 5, 10, 15, 20                                                                                                                           | 1                         |
|                     |                                                                                             | n48     | CA_n48(2A)_BCS1                                                                                                                         |                           |
|                     |                                                                                             | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                         |                           |
| CA_n2A-n66A-n71A    | -                                                                                           | n2      | 5, 10, 15, 20                                                                                                                           | 0                         |
|                     |                                                                                             | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               |                           |
|                     |                                                                                             | n71     | 5, 10, 15, 20                                                                                                                           |                           |
| CA_n2A-n66A-n77A    | n77 <sup>7, 9</sup><br>CA_n2A-n66A<br>CA_n2A-n77A <sup>7</sup><br>CA_n66A-n77A <sup>7</sup> | n2      | 5, 10, 15, 20                                                                                                                           | 0                         |
|                     |                                                                                             | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               |                           |
|                     |                                                                                             | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                         |                           |
| CA_n2(2A)-n66A-n77A | n77 <sup>7</sup><br>CA_n2A-n66A<br>CA_n2A-n77A <sup>7</sup><br>CA_n66A-n77A <sup>7</sup>    | n2      | CA_n2(2A)_BCS0                                                                                                                          | 0                         |
|                     |                                                                                             | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               |                           |
|                     |                                                                                             | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                         |                           |
| CA_n2A-n66(2A)-n77A | n77 <sup>7</sup><br>CA_n2A-n66A<br>CA_n2A-n77A <sup>7</sup><br>CA_n66A-n77A <sup>7</sup>    | n2      | 5, 10, 15, 20                                                                                                                           | 0                         |
|                     |                                                                                             | n66     | CA_n66(2A)_BCS1                                                                                                                         |                           |
|                     |                                                                                             | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                         |                           |
| CA_n2A-n66A-n77C    | CA_n2A-n66A<br>CA_n2A-n77A<br>CA_n66A-n77A                                                  | n2      | 5, 10, 15, 20, 25, 30, 40                                                                                                               | 0                         |
|                     |                                                                                             | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               |                           |
|                     |                                                                                             | n77     | CA_n77C_BCS0                                                                                                                            |                           |
|                     |                                                                                             | n2      | 5, 10, 15, 20, 25, 30, 40                                                                                                               | 1                         |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>6</sup>                            | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|---------------------|------------------------------------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
|                     |                                                                                          | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                     |                                                                                          | n77     | CA_n77C_BCS1                                    |                           |
| CA_n2A-n66A-n77(2A) | n77 <sup>7</sup><br>CA_n2A-n66A<br>CA_n2A-n77A <sup>7</sup><br>CA_n66A-n77A <sup>7</sup> | n2      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                                          | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                     |                                                                                          | n77     | CA_n77(2A)_BCS1                                 |                           |
| CA_n2A-n66A-n78A    | -                                                                                        | n2      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                                          | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                     |                                                                                          | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n2A-n66A-n78(2A) | -                                                                                        | n2      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                                          | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                     |                                                                                          | n78     | CA_n78(2A)_BCS2                                 |                           |
| CA_n2A-n71A-n78A    | -                                                                                        | n2      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                                          | n71     | 5, 10, 15, 20                                   |                           |
|                     |                                                                                          | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n2A-n71A-n78(2A) | -                                                                                        | n2      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                                                          | n71     | 5, 10, 15, 20                                   |                           |
|                     |                                                                                          | n78     | CA_n78(2A)_BCS2                                 |                           |
| CA_n3A-n5A-n7A      | -                                                                                        | n3      | 5, 10, 15, 20, 25, 30                           | 0                         |
|                     |                                                                                          | n5      | 5, 10, 15, 20                                   |                           |
|                     |                                                                                          | n7      | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                     | CA_n3A-n5A<br>CA_n3A-n7A<br>CA_n5A-n7A                                                   | n3      | 5, 10, 15, 20, 25, 30, 40, 50                   | 1                         |
|                     |                                                                                          | n5      | 5, 10, 15, 20                                   |                           |
|                     |                                                                                          | n7      | 5, 10, 15, 20, 25, 30, 40, 50                   |                           |
| CA_n3A-n5A-n7B      | -                                                                                        | n3      | 5, 10, 15, 20, 25, 30                           | 0                         |
|                     |                                                                                          | n5      | 5, 10, 15, 20                                   |                           |
|                     |                                                                                          | n7      | CA_n7B_BCS0                                     |                           |
|                     | CA_n3A-n5A<br>CA_n3A-n7A<br>CA_n5A-n7A<br>CA_n7B                                         | n3      | 5, 10, 15, 20, 25, 30, 40, 50                   | 1                         |
|                     |                                                                                          | n5      | 5, 10, 15, 20                                   |                           |
|                     |                                                                                          | n7      | CA_n7B_BCS0                                     |                           |
| CA_n3A-n5A-n28A     | -                                                                                        | n3      | 5, 10, 15, 20, 25, 30, 40, 50                   | 0                         |
|                     |                                                                                          | n5      | 5, 10, 15, 20                                   |                           |
|                     |                                                                                          | n28     | 5, 10, 15, 20, 30                               |                           |
| CA_n3A-n5A-n78A     | CA_n3A-n5A<br>CA_n3A-n78A<br>CA_n5A-n78A                                                 | n3      | 5, 10, 15, 20, 25, 30, 40, 50                   | 0                         |
|                     |                                                                                          | n5      | 5, 10, 15, 20                                   |                           |
|                     |                                                                                          | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n3A-n7A-n8A      | -                                                                                        | n3      | 5, 10, 15, 20, 25, 30, 35, 40, 50               | 0                         |
|                     |                                                                                          | n7      | 5, 10, 15, 20, 25, 30, 35, 40, 50               |                           |
|                     |                                                                                          | n8      | 5, 10, 15, 20, 35                               |                           |
| CA_n3A-n7A-n28A     | -                                                                                        | n3      | 5, 10, 15, 20, 25, 30                           | 0                         |
|                     |                                                                                          | n7      | 5, 10, 15, 20, 25, 30, 40, 50                   |                           |
|                     |                                                                                          | n28     | 5, 10, 15, 20                                   |                           |
|                     | CA_n3A-n7A<br>CA_n3A-n28A<br>CA_n7A-n28A                                                 | n3      | 5, 10, 15, 20, 25, 30, 40                       | 1                         |
|                     |                                                                                          | n7      | 5, 10, 15, 20, 25, 30, 40, 50                   |                           |
|                     |                                                                                          | n28     | 5, 10, 15, 20                                   |                           |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                              | Bandwidth combination set |
|---------------------|---------------------------------------------------------------|---------|---------------------------------------------------------------|---------------------------|
|                     |                                                               | n3      | 5, 10, 15, 20, 25, 30, 40, 50                                 | 2                         |
|                     |                                                               | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                 |                           |
|                     |                                                               | n28     | 5, 10, 15, 20                                                 |                           |
| CA_n3A-n7B-n28A     | -                                                             | n3      | 5, 10, 15, 20, 25, 30                                         | 0                         |
|                     |                                                               | n7      | CA_n7B_BCS0                                                   |                           |
|                     |                                                               | n28     | 5, 10, 15, 20                                                 |                           |
|                     | CA_n3A-n7A<br>CA_n3A-n28A<br>CA_n7A-n28A<br>CA_n7B            | n3      | 5, 10, 15, 20, 25, 30, 40, 50                                 | 1                         |
|                     |                                                               | n7      | CA_n7B_BCS0                                                   |                           |
|                     |                                                               | n28     | 5, 10, 15, 20                                                 |                           |
| CA_n3A-n7A-n78A     | -                                                             | n3      | 5, 10, 15, 20, 25, 30                                         | 0                         |
|                     |                                                               | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                 |                           |
|                     |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100                   |                           |
|                     | CA_n3A-n7A<br>CA_n3A-n78A<br>CA_n7A-n78A                      | n3      | 5, 10, 15, 20, 25, 30, 40                                     | 1                         |
|                     |                                                               | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                 |                           |
|                     |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70 <sup>4</sup> , 80, 90, 100 |                           |
| CA_n3A-n7B-n78A     | -                                                             | n3      | 5, 10, 15, 20, 25, 30                                         | 0                         |
|                     |                                                               | n7      | CA_n7B_BCS0                                                   |                           |
|                     |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100                   |                           |
|                     | CA_n3A-n7A<br>CA_n3A-n78A<br>CA_n7A-n78A<br>CA_n7B            | n3      | 5, 10, 15, 20, 25, 30, 40                                     | 1                         |
|                     |                                                               | n7      | CA_n7B_BCS0                                                   |                           |
|                     |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70 <sup>4</sup> , 80, 90, 100 |                           |
| CA_n3A-n7A-n78(2A)  | CA_n3A-n7A<br>CA_n3A-n78A<br>CA_n7A-n78A                      | n3      | 5, 10, 15, 20, 25, 30, 40                                     | 0                         |
|                     |                                                               | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                 |                           |
|                     |                                                               | n78     | CA_n78(2A)_BCS2                                               |                           |
| CA_n3A-n8A-n28A     | -                                                             | n3      | 5, 10, 15, 20, 25, 30, 35, 40, 50                             | 0                         |
|                     |                                                               | n8      | 5, 10, 15, 20, 35                                             |                           |
|                     |                                                               | n28     | 5, 10, 15, 20, 30                                             |                           |
| CA_n3A-n8A-n41A     | -                                                             | n3      | 5, 10, 15, 20, 25, 30                                         | 0                         |
|                     |                                                               | n8      | 5, 10, 15, 20                                                 |                           |
|                     |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100                       |                           |
| CA_n3A-n8A-n77A     | -                                                             | n3      | 5, 10, 15, 20, 25, 30                                         | 0                         |
|                     |                                                               | n8      | 5, 10, 15, 20                                                 |                           |
|                     |                                                               | n77     | 10, 15, 20, 40, 50, 60, 80, 90, 100                           |                           |
| CA_n3A-n8A-n77(2A)  | -                                                             | n3      | 5, 10, 15, 20, 25, 30                                         | 0                         |
|                     |                                                               | n8      | 5, 10, 15, 20                                                 |                           |
|                     |                                                               | n77     | CA_n77(2A)_BCS1                                               |                           |
| CA_n3A-n8A-n78A     | CA_n3A-n8A<br>CA_n3A-n78A<br>CA_n8A-n78A                      | n3      | 5, 10, 15, 20, 25, 30                                         | 0                         |
|                     |                                                               | n8      | 5, 10, 15, 20                                                 |                           |
|                     |                                                               | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100                           |                           |
| CA_n3A-n8A-n79A     | -                                                             | n3      | 5, 10, 15, 20, 25, 30                                         | 0                         |
|                     |                                                               | n8      | 5, 10, 15, 20                                                 |                           |
|                     |                                                               | n79     | 40, 50, 60, 80, 100                                           |                           |
| CA_n3A-n18A-n28A    | CA_n3A-n18A<br>CA_n3A-n28A<br>CA_n18A-n28A                    | n3      | 5, 10, 15, 20, 25, 30, 40                                     | 0                         |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|---------------------|---------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
|                     |                                                               | n18     | 5, 10, 15                                       |                           |
|                     |                                                               | n28     | 5, 10                                           |                           |
| CA_n3A-n18A-n41A    | CA_n3A-n41A<br>CA_n3A-n18A<br>CA_n18A-n41A                    | n3      | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                     |                                                               | n18     | 5, 10, 15                                       |                           |
|                     |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100         |                           |
| CA_n3A-n18A-n77A    | CA_n3A-n18A<br>CA_n3A-n77A<br>CA_n18A-n77A                    | n3      | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                     |                                                               | n18     | 5, 10, 15                                       |                           |
|                     |                                                               | n77     | 10, 15, 20, 40, 50, 60, 80, 90, 100             |                           |
| CA_n3A-n18A-n77(2A) | CA_n3A-n18A<br>CA_n3A-n77A<br>CA_n18A-n77A                    | n3      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                               | n18     | 5, 10, 15                                       |                           |
|                     |                                                               | n77     | CA_n77(2A)_BCS1                                 |                           |
| CA_n3A-n20A-n67A    | CA_n3A-n20A                                                   | n3      | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                     |                                                               | n20     | 5, 10, 15, 20                                   |                           |
|                     |                                                               | n67     | 5, 10, 15, 20                                   |                           |
| CA_n3A-n20A-n78A    | -                                                             | n3      | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                     |                                                               | n20     | 5, 10, 15, 20                                   |                           |
|                     |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n3A-n28A-n41A    | CA_n3A-n28A<br>CA_n3A-n41A<br>CA_n28A-n41A                    | n3      | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                     |                                                               | n28     | 5, 10, 15, 20, 30                               |                           |
|                     |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100         |                           |
| CA_n3A-n28A-n41B    | CA_n3A-n28A<br>CA_n3A-n41A<br>CA_n28A-n41A                    | n3      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                               | n28     | 5, 10                                           |                           |
|                     |                                                               | n41     | CA_n41B_BCS0                                    |                           |
| CA_n3A-n28A-n77A    | CA_n3A-n28A<br>CA_n3A-n77A<br>CA_n28A-n77A                    | n3      | 5, 10, 15, 20, 25, 30                           | 0                         |
|                     |                                                               | n28     | 5, 10, 15, 20                                   |                           |
|                     |                                                               | n77     | 10, 15, 20, 40, 50, 60, 80, 90, 100             |                           |
|                     |                                                               | n3      | 5, 10, 15, 20, 25, 30, 40                       | 1                         |
|                     |                                                               | n28     | 5, 10, 15, 20, 30                               |                           |
|                     |                                                               | n77     | 10, 15, 20, 40, 50, 60, 80, 90, 100             |                           |
| CA_n3A-n28A-n77(2A) | CA_n3A-n28A<br>CA_n3A-n77A<br>CA_n28A-n77A<br>CA_n77(2A)      | n3      | 5, 10, 15, 20, 25, 30                           | 0                         |
|                     |                                                               | n28     | 5, 10, 15, 20                                   |                           |
|                     |                                                               | n77     | CA_n77(2A)_BCS0                                 |                           |
|                     |                                                               | n3      | 5, 10, 15, 20, 25, 30, 40                       | 1                         |
|                     |                                                               | n28     | 5, 10, 15, 20, 30                               |                           |
| CA_n3A-n28A-n77(3A) | CA_n3A-n28A<br>CA_n3A-n77A<br>CA_n28A-n77A                    | n77     | CA_n77(3A)_BCS0                                 |                           |
|                     |                                                               | n3      | 5, 10, 15, 20, 25, 30                           | 0                         |
|                     |                                                               | n28     | 5, 10, 15, 20                                   |                           |
| CA_n3A-n28A-n78A    | CA_n3A-n28A<br>CA_n3A-n78A<br>CA_n28A-n78A                    | n3      | 5, 10, 15, 20                                   | 0                         |
|                     |                                                               | n28     | 5, 10, 15, 20 <sup>2</sup>                      |                           |
|                     |                                                               | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100             |                           |
|                     |                                                               | n3      | 5, 10, 15, 20, 25, 30, 40                       | 1                         |
|                     |                                                               | n28     | 5, 10, 15, 20 <sup>2</sup>                      |                           |



| NR CA configuration              | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                   | Bandwidth combination set |
|----------------------------------|---------------------------------------------------------------|---------|----------------------------------------------------|---------------------------|
|                                  |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100    | 2                         |
|                                  |                                                               | n3      | 5, 10, 15, 20, 25, 30, 40                          |                           |
|                                  |                                                               | n28     | 5, 10                                              |                           |
|                                  |                                                               | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100                |                           |
| CA_n3A-n28A-n78(2A)              | CA_n3A-n28A<br>CA_n3A-n78A<br>CA_n28A-n78A                    | n3      | 5, 10, 15, 20                                      | 0                         |
|                                  |                                                               | n28     | 5, 10, 15, 20 <sup>2</sup>                         |                           |
|                                  |                                                               | n78     | CA_n78(2A)_BCS0                                    |                           |
|                                  |                                                               | n3      | 5, 10, 15, 20, 25, 30, 40                          | 1                         |
|                                  |                                                               | n28     | 5, 10                                              |                           |
|                                  |                                                               | n78     | CA_n78(2A)_BCS2                                    |                           |
|                                  |                                                               | n3      | 5, 10, 15, 20, 25, 30, 40                          | 2                         |
|                                  |                                                               | n28     | 5, 10, 15, 20                                      |                           |
|                                  |                                                               | n78     | CA_n78(2A)_BCS2                                    |                           |
| CA_n3A-n28A-n79A                 | CA_n3A-n28A<br>CA_n3A-n79A<br>CA_n28A-n79A                    | n3      | 5, 10, 15, 20, 25, 30                              | 0                         |
|                                  |                                                               | n28     | 5, 10, 15, 20                                      |                           |
|                                  |                                                               | n79     | 40, 50, 80, 100                                    |                           |
| CA_n3A-n38A-n40A                 | -                                                             | n3      | 5, 10, 15, 20, 25, 30, 40, 50                      | 0                         |
|                                  |                                                               | n38     | 5, 10, 15, 20, 25, 30, 40                          |                           |
|                                  |                                                               | n40     | 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n3A-n77A-n79A <sup>4</sup>    | CA_n3A-n77A<br>CA_n3A-n79A<br>CA_n77A-n79A                    | n3      | 5, 10, 15, 20, 25, 30                              | 0                         |
|                                  |                                                               | n77     | 10, 15, 20, 40, 50, 60, 80, 90, 100                |                           |
|                                  |                                                               | n79     | 40, 50, 60, 80, 100                                |                           |
| CA_n3A-n77(2A)-n79A <sup>4</sup> | CA_n3A-n77A<br>CA_n3A-n79A<br>CA_n77A-n79A                    | n3      | 5, 10, 15, 20, 25, 30                              | 0                         |
|                                  |                                                               | n77     | CA_n77(2A)_BCS0                                    |                           |
|                                  |                                                               | n79     | 40, 50, 60, 80, 100                                |                           |
| CA_n3A-n40A-n41A                 | CA_n3A-n40A<br>CA_n3A-n41A<br>CA_n40A-n41A                    | n3      | 5, 10, 15, 20, 25, 30                              | 0                         |
|                                  |                                                               | n40     | 5, 10, 15, 20, 25, 30, 40, 50, 60, 80              |                           |
|                                  |                                                               | n41     | 10, 15, 20, 40, 50, 60, 80, 90, 100                |                           |
| CA_n3A-n41A-n77A                 | CA_n3A-n41A<br>CA_n3A-n77A<br>CA_n41A-n77A                    | n3      | 5, 10, 15, 20, 25, 30, 40                          | 0                         |
|                                  |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100            |                           |
|                                  |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100    |                           |
| CA_n3A-n41B-n77A                 | CA_n3A-n41A<br>CA_n3A-n77A<br>CA_n41A-n77A                    | n3      | 5, 10, 15, 20                                      | 0                         |
|                                  |                                                               | n41     | CA_n41B_BCS0                                       |                           |
|                                  |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100    |                           |
| CA_n3A-n41A-n77(2A)              | CA_n3A-n41A<br>CA_n3A-n77A<br>CA_n41A-n77A                    | n3      | 5, 10, 15, 20, 25, 30, 40                          | 0                         |
|                                  |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100            |                           |
|                                  |                                                               | n77     | CA_n77(2A)_BCS0                                    |                           |
| CA_n3A-n41A-n77(3A)              | CA_n3A-n41A<br>CA_n3A-n77A<br>CA_n41A-n77A                    | n3      | 5, 10, 15, 20                                      | 0                         |
|                                  |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100            |                           |
|                                  |                                                               | n77     | CA_n77(3A)_BCS1                                    |                           |
| CA_n3A-n41A-n78A                 | -                                                             | n3      | 5, 10, 15, 20, 25, 30, 40                          | 0                         |
|                                  |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100            |                           |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>6</sup>                            | NR Band | Channel bandwidth (MHz) (NOTE 3)                              | Bandwidth combination set |
|---------------------|------------------------------------------------------------------------------------------|---------|---------------------------------------------------------------|---------------------------|
|                     | CA_n3A-n41A<br>CA_n3A-n78A<br>CA_n41A-n78A                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100               | 1                         |
|                     |                                                                                          | n3      | 5, 10, 15, 20, 25, 30, 40                                     |                           |
|                     |                                                                                          | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100                       |                           |
|                     |                                                                                          | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100                           |                           |
| CA_n3A-n41A-n78(2A) | CA_n3A-n41A<br>CA_n3A-n78A<br>CA_n41A-n78A                                               | n3      | 5, 10, 15, 20, 25, 30, 40                                     | 0                         |
|                     |                                                                                          | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100                       |                           |
|                     |                                                                                          | n78     | CA_n78(2A) BCS2                                               |                           |
| CA_n3A-n41A-n79A    | -                                                                                        | n3      | 5, 10, 15, 20, 25, 30                                         | 0                         |
|                     |                                                                                          | n41     | 10, 15, 20, 40, 50, 60, 80, 100                               |                           |
|                     |                                                                                          | n79     | 40, 50, 60, 80, 100                                           |                           |
|                     |                                                                                          | n3      | 5, 10, 15, 20, 25, 30                                         | 1                         |
|                     |                                                                                          | n41     | 10, 15, 20, 40, 50, 60, 80                                    |                           |
|                     |                                                                                          | n79     | 40, 50, 60, 80, 100                                           |                           |
|                     |                                                                                          |         |                                                               |                           |
| CA_n5A-n7A-n28A     | -                                                                                        | n5      | 5, 10, 15, 20                                                 | 0                         |
|                     |                                                                                          | n7      | 5, 10, 15, 25, 30, 40, 50                                     |                           |
|                     |                                                                                          | n28     | 5, 10, 15, 20, 30                                             |                           |
| CA_n5A-n7A-n78A     | CA_n5A-n78A <sup>7</sup><br>CA_n7A-n78A <sup>7</sup>                                     | n5      | 5, 10, 15, 20                                                 | 0                         |
|                     |                                                                                          | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                 |                           |
|                     |                                                                                          | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100               |                           |
|                     | CA_n5A-n7A<br>CA_n5A-n78A<br>CA_n7A-n78A                                                 | n5      | 5, 10, 15, 20                                                 | 1                         |
|                     |                                                                                          | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                 |                           |
|                     |                                                                                          | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70 <sup>4</sup> , 80, 90, 100 |                           |
| CA_n5A-n7B-n78A     | CA_n5A-n78A <sup>7</sup><br>CA_n7A-n78A <sup>7</sup>                                     | n5      | 5, 10, 15, 20                                                 | 0                         |
|                     |                                                                                          | n7      | CA_n7B BCS0                                                   |                           |
|                     |                                                                                          | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100               |                           |
|                     | CA_n5A-n7A<br>CA_n5A-n78A<br>CA_n7A-n78A<br>CA_n7B                                       | n5      | 5, 10, 15, 20                                                 | 1                         |
|                     |                                                                                          | n7      | CA_n7B BCS0                                                   |                           |
|                     |                                                                                          | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70 <sup>4</sup> , 80, 90, 100 |                           |
| CA_n5A-n12A-n77A    | n77 <sup>7</sup><br>CA_n5A-n12A<br>CA_n5A-n77A <sup>7</sup><br>CA_n12A-n77A <sup>7</sup> | n5      | 5, 10, 15, 20                                                 | 0                         |
|                     |                                                                                          | n12     | 5, 10, 15                                                     |                           |
|                     |                                                                                          | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100               |                           |
| CA_n5A-n12A-n77(2A) | n77 <sup>7</sup><br>CA_n5A-n12A<br>CA_n5A-n77A <sup>7</sup><br>CA_n12A-n77A <sup>7</sup> | n5      | 5, 10, 15, 20                                                 | 0                         |
|                     |                                                                                          | n12     | 5, 10, 15                                                     |                           |
|                     |                                                                                          | n77     | CA_n77(2A) BCS1                                               |                           |
| CA_n5A-n14A-n77A    | n77 <sup>7</sup><br>CA_n5A-n14A<br>CA_n5A-n77A <sup>7</sup><br>CA_n14A-n77A <sup>7</sup> | n5      | 5, 10, 15, 20                                                 | 0                         |
|                     |                                                                                          | n14     | 5, 10                                                         |                           |
|                     |                                                                                          | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100               |                           |
| CA_n5A-n14A-n77(2A) | n77 <sup>7</sup>                                                                         | n5      | 5, 10, 15, 20                                                 | 0                         |

| NR CA configuration    | Uplink CA configuration or single uplink carrier <sup>6</sup>        | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|------------------------|----------------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
|                        | CA_n5A-n14A<br>CA_n5A-n77A <sup>7</sup><br>CA_n14A-n77A <sup>7</sup> |         |                                                 |                           |
|                        |                                                                      | n14     | 5, 10                                           |                           |
|                        |                                                                      | n77     | CA_n77(2A)_BCS1                                 |                           |
| CA_n5A-n25A-n66A       | CA_n5A-n25A<br>CA_n5A-n66A<br>CA_n25A-n66A                           | n5      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                                      | n25     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                        |                                                                      | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
| CA_n5A-n25(2A)-n66A    | CA_n5A-n25A<br>CA_n5A-n66A<br>CA_n25A-n66A                           | n5      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                                      | n25     | CA_n25(2A)_BCS0                                 |                           |
|                        |                                                                      | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
| CA_n5A-n25A-n66(2A)    | CA_n5A-n25A<br>CA_n5A-n66A<br>CA_n25A-n66A                           | n5      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                                      | n25     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                        |                                                                      | n66     | CA_n66(2A)_BCS1                                 |                           |
| CA_n5A-n25(2A)-n66(2A) | CA_n5A-n25A<br>CA_n5A-n66A<br>CA_n25A-n66A                           | n5      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                                      | n25     | CA_n25(2A)_BCS0                                 |                           |
|                        |                                                                      | n66     | CA_n66(2A)_BCS1                                 |                           |
| CA_n5A-n25A-n77A       | CA_n5A-n25A<br>CA_n5A-n77A<br>CA_n25A-n77A                           | n5      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                                      | n25     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                        |                                                                      | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n5A-n25(2A)-n77A    | CA_n5A-n25A<br>CA_n5A-n77A<br>CA_n25A-n77A                           | n5      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                                      | n25     | CA_n25(2A)_BCS0                                 |                           |
|                        |                                                                      | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n5A-n25A-n77(2A)    | CA_n5A-n25A<br>CA_n5A-n77A<br>CA_n25A-n77A                           | n5      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                                      | n25     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                        |                                                                      | n77     | CA_n77(2A)_BCS1                                 |                           |
| CA_n5A-n25(2A)-n77(2A) | CA_n5A-n25A<br>CA_n5A-n77A<br>CA_n25A-n77A                           | n5      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                                      | n25     | CA_n25(2A)_BCS0                                 |                           |
|                        |                                                                      | n77     | CA_n77(2A)_BCS1                                 |                           |
| CA_n5A-n25A-n78A       | CA_n5A-n25A<br>CA_n5A-n78A<br>CA_n25A-n78A                           | n5      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                                      | n25     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                        |                                                                      | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n5A-n25(2A)-n78A    | CA_n5A-n25A<br>CA_n5A-n78A<br>CA_n25A-n78A                           | n5      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                                      | n25     | CA_n25(2A)_BCS0                                 |                           |
|                        |                                                                      | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n5A-n25A-n78(2A)    | CA_n5A-n25A<br>CA_n5A-n78A<br>CA_n25A-n78A                           | n5      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                                      | n25     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                        |                                                                      | n78     | CA_n78(2A)_BCS2                                 |                           |

| NR CA configuration    | Uplink CA configuration or single uplink carrier <sup>6</sup>                            | NR Band | Channel bandwidth (MHz) (NOTE 3)                                                                                                        | Bandwidth combination set |
|------------------------|------------------------------------------------------------------------------------------|---------|-----------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| CA_n5A-n25(2A)-n78(2A) | CA_n5A-n25A<br>CA_n5A-n78A<br>CA_n25A-n78A                                               | n5      | 5, 10, 15, 20                                                                                                                           | 0                         |
|                        |                                                                                          | n25     | CA_n25(2A)_BCS0                                                                                                                         |                           |
|                        |                                                                                          | n78     | CA_n78(2A)_BCS2                                                                                                                         |                           |
| CA_n5A-n29A-n77A       | n77 <sup>7</sup><br>CA_n5A-n77A <sup>7</sup>                                             | n5      | 5, 10, 15, 20                                                                                                                           | 0                         |
|                        |                                                                                          | n29     | 5, 10                                                                                                                                   |                           |
|                        |                                                                                          | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                         |                           |
| CA_n5A-n29A-n77(2A)    | n77 <sup>7</sup><br>CA_n5A-n77A <sup>7</sup>                                             | n5      | 5, 10, 15, 20                                                                                                                           | 0                         |
|                        |                                                                                          | n29     | 5, 10                                                                                                                                   |                           |
|                        |                                                                                          | n77     | CA_n77(2A)_BCS1                                                                                                                         |                           |
| CA_n5A-n30A-n66A       | CA_n5A-n30A<br>CA_n5A-n66A<br>CA_n30A-n66A                                               | n5      | 5, 10, 15, 20                                                                                                                           | 0                         |
|                        |                                                                                          | n30     | 5, 10                                                                                                                                   |                           |
|                        |                                                                                          | n66     | 5, 10, 15, 20, 40                                                                                                                       |                           |
| CA_n5A-n30A-n66(2A)    | CA_n5A-n30A<br>CA_n5A-n66A<br>CA_n30A-n66A                                               | n5      | 5, 10, 15, 20                                                                                                                           | 0                         |
|                        |                                                                                          | n30     | 5, 10                                                                                                                                   |                           |
|                        |                                                                                          | n66     | CA_n66(2A)_BCS0                                                                                                                         |                           |
| CA_n5A-n30A-n66(3A)    | CA_n5A-n30A<br>CA_n5A-n66A<br>CA_n30A-n66A                                               | n5      | 5, 10, 15, 20                                                                                                                           | 0                         |
|                        |                                                                                          | n30     | 5, 10                                                                                                                                   |                           |
|                        |                                                                                          | n66     | CA_n66(3A)_BCS0                                                                                                                         |                           |
| CA_n5A-n30A-n77A       | n77 <sup>7</sup><br>CA_n5A-n30A<br>CA_n5A-n77A <sup>7</sup><br>CA_n30A-n77A <sup>7</sup> | n5      | 5, 10, 15, 20                                                                                                                           | 0                         |
|                        |                                                                                          | n30     | 5, 10                                                                                                                                   |                           |
|                        |                                                                                          | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                         |                           |
| CA_n5A-n30A-n77(2A)    | n77 <sup>7</sup><br>CA_n5A-n30A<br>CA_n5A-n77A <sup>7</sup><br>CA_n30A-n77A <sup>7</sup> | n5      | 5, 10, 15, 20                                                                                                                           | 0                         |
|                        |                                                                                          | n30     | 5, 10                                                                                                                                   |                           |
|                        |                                                                                          | n77     | CA_n77(2A)_BCS1                                                                                                                         |                           |
| CA_n5A-n40A-n78A       | CA_n5A-n40A<br>CA_n5A-n78A<br>CA_n40A-n78A                                               | n5      | 5, 10, 15, 20, 25 <sup>1</sup>                                                                                                          | 0                         |
|                        |                                                                                          | n40     | 5 <sup>8</sup> , 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                        |                           |
|                        |                                                                                          | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                         |                           |
| CA_n5A-n48A-n66A       | CA_n5A-n48A<br>CA_n5A-n66A<br>CA_n48A-n66A                                               | n5      | 5, 10, 15, 20                                                                                                                           | 0                         |
|                        |                                                                                          | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> |                           |
|                        |                                                                                          | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               |                           |
| CA_n5A-n48(A-B)-n66A   | CA_n5A-n48A<br>CA_n5A-n66A<br>CA_n48A-n66A                                               | n5      | 5, 10, 15, 20, 25 <sup>1</sup>                                                                                                          | 0                         |
|                        |                                                                                          | n48     | CA_n48(A-B)_BCS0                                                                                                                        |                           |
|                        |                                                                                          | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               |                           |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                                                                                                        | Bandwidth combination set |
|---------------------|---------------------------------------------------------------|---------|-----------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
|                     |                                                               | n5      | 5, 10, 15, 20, 25 <sup>1</sup>                                                                                                          | 1                         |
|                     |                                                               | n48     | CA_n48(A-B)_BCS1                                                                                                                        |                           |
|                     |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               |                           |
| CA_n5A-n48B-n66A    | CA_n5A-n48A<br>CA_n5A-n66A<br>CA_n48A-n66A                    | n5      | 5, 10, 15, 20                                                                                                                           | 0                         |
|                     |                                                               | n48     | CA_n48B_BCS0                                                                                                                            |                           |
|                     |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               |                           |
|                     |                                                               | n5      | 5, 10, 15, 20                                                                                                                           | 1                         |
|                     |                                                               | n48     | CA_n48B_BCS1                                                                                                                            |                           |
|                     |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               | 2                         |
|                     |                                                               | n5      | 5, 10, 15, 20                                                                                                                           |                           |
|                     |                                                               | n48     | CA_n48B_BCS2                                                                                                                            |                           |
|                     |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               |                           |
| CA_n5A-n48(2A)-n66A | CA_n5A-n48A<br>CA_n5A-n66A<br>CA_n48A-n66A                    | n5      | 5, 10, 15, 20                                                                                                                           | 0                         |
|                     |                                                               | n48     | CA_n48(2A)_BCS0                                                                                                                         |                           |
|                     |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               |                           |
|                     |                                                               | n5      | 5, 10, 15, 20                                                                                                                           | 1                         |
|                     |                                                               | n48     | CA_n48(2A)_BCS1                                                                                                                         |                           |
| CA_n5A-n48A-n77A    | n77 <sup>7,9</sup><br>CA_n5A-n48A<br>CA_n5A-n77A              | n5      | 5, 10, 15, 20                                                                                                                           | 0                         |
|                     |                                                               | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> |                           |
|                     |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                         |                           |
| CA_n5A-n48A-n77C    | CA_n5A-n48A<br>CA_n5A-n77A<br>CA_n77C                         | n5      | 5, 10, 15, 20, 25 <sup>1</sup>                                                                                                          | 0                         |
|                     |                                                               | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> |                           |
|                     |                                                               | n77     | CA_n77C_BCS0                                                                                                                            |                           |
|                     |                                                               | n5      | 5, 10, 15, 20, 25 <sup>1</sup>                                                                                                          | 1                         |
|                     |                                                               | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> |                           |
| CA_n5A-n48B-n77A    | CA_n5A-n48A<br>CA_n5A-n77A                                    | n77     | CA_n77C_BCS1                                                                                                                            | 0                         |
|                     |                                                               | n5      | 5, 10, 15, 20                                                                                                                           |                           |
|                     |                                                               | n48     | CA_n48B_BCS0                                                                                                                            |                           |
|                     |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                         | 1                         |
|                     |                                                               | n5      | 5, 10, 15, 20                                                                                                                           |                           |
|                     |                                                               | n48     | CA_n48B_BCS1                                                                                                                            | 2                         |
|                     |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                         |                           |
| CA_n5A-n48B-n77C    | CA_n5A-n48A<br>CA_n5A-n77A                                    | n5      | 5, 10, 15, 20                                                                                                                           | 0                         |
|                     |                                                               | n48     | CA_n48B_BCS0                                                                                                                            |                           |
|                     |                                                               | n77     | CA_n77C_BCS0                                                                                                                            |                           |
|                     |                                                               | n5      | 5, 10, 15, 20                                                                                                                           | 1                         |
|                     |                                                               | n48     | CA_n48B_BCS0                                                                                                                            |                           |
|                     |                                                               | n77     | CA_n77C_BCS1                                                                                                                            | 2                         |
|                     |                                                               | n5      | 5, 10, 15, 20                                                                                                                           |                           |
|                     |                                                               | n48     | CA_n48B_BCS1                                                                                                                            |                           |
|                     |                                                               | n77     | CA_n77C_BCS0                                                                                                                            |                           |

| NR CA configuration    | Uplink CA configuration or single uplink carrier <sup>6</sup>                               | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|------------------------|---------------------------------------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
|                        |                                                                                             | n5      | 5, 10, 15, 20                                   | 3                         |
|                        |                                                                                             | n48     | CA_n48B_BCS1                                    |                           |
|                        |                                                                                             | n77     | CA_n77C_BCS1                                    |                           |
| CA_n5A-n48(2A)-n77A    | CA_n5A-n48A<br>CA_n5A-n77A                                                                  | n5      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                                                             | n48     | CA_n48(2A)_BCS0                                 |                           |
|                        |                                                                                             | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                        |                                                                                             | n5      | 5, 10, 15, 20                                   | 1                         |
|                        |                                                                                             | n48     | CA_n48(2A)_BCS1                                 |                           |
|                        |                                                                                             | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n5A-n48(2A)-n77C    | CA_n5A-n48A<br>CA_n5A-n77A                                                                  | n5      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                                                             | n48     | CA_n48(2A)_BCS0                                 |                           |
|                        |                                                                                             | n77     | CA_n77C_BCS0                                    |                           |
|                        |                                                                                             | n5      | 5, 10, 15, 20                                   | 1                         |
|                        |                                                                                             | n48     | CA_n48(2A)_BCS0                                 |                           |
|                        |                                                                                             | n77     | CA_n77C_BCS1                                    |                           |
|                        |                                                                                             | n5      | 5, 10, 15, 20                                   | 2                         |
|                        |                                                                                             | n48     | CA_n48(2A)_BCS1                                 |                           |
|                        |                                                                                             | n77     | CA_n77C_BCS0                                    |                           |
|                        |                                                                                             | n5      | 5, 10, 15, 20                                   | 3                         |
|                        |                                                                                             | n48     | CA_n48(2A)_BCS1                                 |                           |
|                        |                                                                                             | n77     | CA_n77C_BCS1                                    |                           |
| CA_n5A-n66A-n77A       | n77 <sup>7, 9</sup><br>CA_n5A-n66A<br>CA_n5A-n77A <sup>7</sup><br>CA_n66A-n77A <sup>7</sup> | n5      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                                                             | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                        |                                                                                             | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n5A-n66(2A)-n77A    | n77 <sup>7</sup><br>CA_n5A-n66A<br>CA_n5A-n77A <sup>7</sup><br>CA_n66A-n77A <sup>7</sup>    | n5      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                                                             | n66     | CA_n66(2A)_BCS1                                 |                           |
|                        |                                                                                             | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n5A-n66(2A)-n77(2A) | CA_n5A-n66A<br>CA_n5A-n77A<br>CA_n66A-n77A                                                  | n5      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                                                             | n66     | CA_n66(2A)_BCS1                                 |                           |
|                        |                                                                                             | n77     | CA_n77(2A)_BCS1                                 |                           |
| CA_n5A-n66A-n77C       | CA_n5A-n66A<br>CA_n5A-n77A<br>CA_n66A-n77A                                                  | n5      | 5, 10, 15, 20, 25 <sup>1</sup>                  | 0                         |
|                        |                                                                                             | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                        |                                                                                             | n77     | CA_n77C_BCS0                                    |                           |
|                        |                                                                                             | n5      | 5, 10, 15, 20, 25 <sup>1</sup>                  | 1                         |
|                        |                                                                                             | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
| CA_n5A-n66A-n77(2A)    | n77 <sup>7</sup><br>CA_n5A-n66A<br>CA_n5A-n77A <sup>7</sup><br>CA_n66A-n77A <sup>7</sup>    | n5      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                                                             | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                        |                                                                                             | n77     | CA_n77(2A)_BCS1                                 |                           |

| NR CA configuration    | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|------------------------|---------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
| CA_n5A-n66A-n78A       | CA_n5A-n66A<br>CA_n5A-n78A<br>CA_n66A-n78A                    | n5      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                        |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100     |                           |
|                        |                                                               | n5      | 5, 10, 15, 20                                   | 1                         |
|                        |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                        |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n5A-n66(2A)-n78A    | CA_n5A-n66A<br>CA_n5A-n78A<br>CA_n66A-n78A                    | n5      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                               | n66     | CA_n66(2A)_BCS1                                 |                           |
|                        |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n5A-n66A-n78(2A)    | CA_n5A-n66A<br>CA_n5A-n78A<br>CA_n66A-n78A                    | n5      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                        |                                                               | n78     | CA_n78(2A)_BCS2                                 |                           |
| CA_n5A-n66(2A)-n78(2A) | CA_n5A-n66A<br>CA_n5A-n78A<br>CA_n66A-n78A                    | n5      | 5, 10, 15, 20                                   | 0                         |
|                        |                                                               | n66     | CA_n66(2A)_BCS1                                 |                           |
|                        |                                                               | n78     | CA_n78(2A)_BCS2                                 |                           |
| CA_n7A-n8A-n28A        | -                                                             | n7      | 5, 10, 15, 20, 25, 30, 40, 50                   | 0                         |
|                        |                                                               | n8      | 5, 10, 15, 20                                   |                           |
|                        |                                                               | n28     | 5, 10, 15, 20, 30                               |                           |
| CA_n7A-n8A-n40A        | CA_n7A-n8A<br>CA_n7A-n40A<br>CA_n8A-n40A                      | n7      | 5, 10, 15, 20, 25, 30, 40, 50                   | 0                         |
|                        |                                                               | n8      | 5, 10, 15, 20                                   |                           |
|                        |                                                               | n40     | 5, 10, 15, 20, 25, 30, 40, 50, 60, 80           |                           |
| CA_n7A-n8A-n78A        | CA_n7A-n8A<br>CA_n7A-n78A<br>CA_n8A-n78A                      | n7      | 5, 10, 15, 20, 25, 30, 40, 50                   | 0                         |
|                        |                                                               | n8      | 5, 10, 15, 20                                   |                           |
|                        |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n7A-n25A-n66A       | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n25A-n66A                    | n7      | 5, 10, 15, 20, 25, 30, 40, 50                   | 0                         |
|                        |                                                               | n25     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                        |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
| CA_n7A-n25(2A)-n66A    | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n25A-n66A                    | n7      | 5, 10, 15, 20, 25, 30, 40, 50                   | 0                         |
|                        |                                                               | n25     | CA_n25(2A)_BCS0                                 |                           |
|                        |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
| CA_n7A-n25(2A)-n66(2A) | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n25A-n66A                    | n7      | 5, 10, 15, 20, 25, 30, 40, 50                   | 0                         |
|                        |                                                               | n25     | CA_n25(2A)_BCS0                                 |                           |
|                        |                                                               | n66     | CA_n66(2A)_BCS1                                 |                           |
| CA_n7A-n25A-n66(2A)    | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n25A-n66A                    | n7      | 5, 10, 15, 20, 25, 30, 40, 50                   | 0                         |
|                        |                                                               | n25     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                        |                                                               | n66     | CA_n66(2A)_BCS1                                 |                           |
| CA_n7(2A)-n25A-n66A    | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n25A-n66A                    | n7      | CA_n7(2A)_BCS0                                  | 0                         |

| NR CA configuration       | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|---------------------------|---------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
|                           |                                                               | n25     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                           |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
| CA_n7(2A)-n25(2A)-n66A    | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n25A-n66A                    | n7      | CA_n7(2A)_BCS0                                  | 0                         |
|                           |                                                               | n25     | CA_n25(2A)_BCS0                                 |                           |
|                           |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
| CA_n7(2A)-n25A-n66(2A)    | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n25A-n66A                    | n7      | CA_n7(2A)_BCS0                                  | 0                         |
|                           |                                                               | n25     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                           |                                                               | n66     | CA_n66(2A)_BCS1                                 |                           |
| CA_n7(2A)-n25(2A)-n66(2A) | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n25A-n66A                    | n7      | CA_n7(2A)_BCS0                                  | 0                         |
|                           |                                                               | n25     | CA_n25(2A)_BCS0                                 |                           |
|                           |                                                               | n66     | CA_n66(2A)_BCS1                                 |                           |
| CA_n7A-n25A-n77A          | CA_n7A-n25A<br>CA_n7A_n77A<br>CA_n25A-n77A                    | n7      | 5, 10, 15, 20, 25, 30, 40, 50                   | 0                         |
|                           |                                                               | n25     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                           |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n7A-n25(2A)-n77A       | CA_n7A-n25A<br>CA_n7A_n77A<br>CA_n25A-n77A                    | n7      | 5, 10, 15, 20, 25, 30, 40, 50                   | 0                         |
|                           |                                                               | n25     | CA_n25(2A)_BCS0                                 |                           |
|                           |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n7A-n25A-n77(2A)       | CA_n7A-n25A<br>CA_n7A_n77A<br>CA_n25A-n77A                    | n7      | 5, 10, 15, 20, 25, 30, 40, 50                   | 0                         |
|                           |                                                               | n25     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                           |                                                               | n77     | CA_n77(2A)_BCS1                                 |                           |
| CA_n7A-n25(2A)-n77(2A)    | CA_n7A-n25A<br>CA_n7A_n77A<br>CA_n25A-n77A                    | n7      | 5, 10, 15, 20, 25, 30, 40, 50                   | 0                         |
|                           |                                                               | n25     | CA_n25(2A)_BCS0                                 |                           |
|                           |                                                               | n77     | CA_n77(2A)_BCS1                                 |                           |
| CA_n7(2A)-n25A-n77A       | CA_n7A-n25A<br>CA_n7A_n77A<br>CA_n25A-n77A                    | n7      | CA_n7(2A)_BCS0                                  | 0                         |
|                           |                                                               | n25     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                           |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n7(2A)-n25(2A)-n77A    | CA_n7A-n25A<br>CA_n7A_n77A<br>CA_n25A-n77A                    | n7      | CA_n7(2A)_BCS0                                  | 0                         |
|                           |                                                               | n25     | CA_n25(2A)_BCS0                                 |                           |
|                           |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n7(2A)-n25A-n77(2A)    | CA_n7A-n25A<br>CA_n7A_n77A<br>CA_n25A-n77A                    | n7      | CA_n7(2A)_BCS0                                  | 0                         |
|                           |                                                               | n25     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                           |                                                               | n77     | CA_n77(2A)_BCS1                                 |                           |
| CA_n7(2A)-n25(2A)-n77(2A) | CA_n7A-n25A<br>CA_n7A_n77A<br>CA_n25A-n77A                    | n7      | CA_n7(2A)_BCS0                                  | 0                         |
|                           |                                                               | n25     | CA_n25(2A)_BCS0                                 |                           |
|                           |                                                               | n77     | CA_n77(2A)_BCS1                                 |                           |
| CA_n7A-n25A-n78A          | CA_n7A-n25A<br>CA_n7A-n78A                                    | n7      | 5, 10, 15, 20, 25, 30, 40, 50                   | 0                         |



| NR CA configuration       | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                                            | Bandwidth combination set |
|---------------------------|---------------------------------------------------------------|---------|-----------------------------------------------------------------------------|---------------------------|
|                           | CA_n25A-n78A                                                  |         |                                                                             |                           |
|                           |                                                               | n25     | 5, 10, 15, 20, 25, 30, 40                                                   |                           |
|                           |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70 <sup>4</sup> , 80, 90 <sup>4</sup> , 100 |                           |
| CA_n7(2A)-n25A-n78A       | -                                                             | n7      | CA_n7(2A)_BCS0                                                              | 0                         |
|                           |                                                               | n25     | 5, 10, 15, 20, 25, 30, 40                                                   |                           |
|                           |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70 <sup>4</sup> , 80, 90 <sup>4</sup> , 100 |                           |
| CA_n7A-n25(2A)-n78A       | -                                                             | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                               | 0                         |
|                           |                                                               | n25     | CA_n25(2A)_BCS0                                                             |                           |
|                           |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70 <sup>4</sup> , 80, 90 <sup>4</sup> , 100 |                           |
| CA_n7(2A)-n25(2A)-n78A    | -                                                             | n7      | CA_n7(2A)_BCS0                                                              | 0                         |
|                           |                                                               | n25     | CA_n25(2A)_BCS0                                                             |                           |
|                           |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70 <sup>4</sup> , 80, 90 <sup>4</sup> , 100 |                           |
| CA_n7A-n25A-n78(2A)       | CA_n7A-n25A<br>CA_n7A-n78A<br>CA_n25A-n78A                    | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                               | 0                         |
|                           |                                                               | n25     | 5, 10, 15, 20, 25, 30, 40                                                   |                           |
|                           |                                                               | n78     | CA_n78(2A)_BCS0                                                             |                           |
|                           |                                                               | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                               | 1                         |
|                           |                                                               | n25     | 5, 10, 15, 20, 25, 30, 40                                                   |                           |
|                           |                                                               | n78     | CA_n78(2A)_BCS2                                                             |                           |
| CA_n7(2A)-n25A-n78(2A)    | -                                                             | n7      | CA_n7(2A)_BCS0                                                              | 0                         |
|                           |                                                               | n25     | 5, 10, 15, 20, 25, 30, 40                                                   |                           |
|                           |                                                               | n78     | CA_n78(2A)_BCS0                                                             |                           |
| CA_n7A-n25(2A)-n78(2A)    | -                                                             | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                               | 0                         |
|                           |                                                               | n25     | CA_n25(2A)_BCS0                                                             |                           |
|                           |                                                               | n78     | CA_n78(2A)_BCS0                                                             |                           |
| CA_n7(2A)-n25(2A)-n78(2A) | -                                                             | n7      | CA_n7(2A)_BCS0                                                              | 0                         |
|                           |                                                               | n25     | CA_n25(2A)_BCS0                                                             |                           |
|                           |                                                               | n78     | CA_n78(2A)_BCS0                                                             |                           |
| CA_n7A-n28A-n78(2A)       | CA_n7A-n28A<br>CA_n7A-n78A<br>CA_n28A-n78A                    | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                               | 0                         |
|                           |                                                               | n28     | 5, 10, 15, 20                                                               |                           |
|                           |                                                               | n78     | CA_n78(2A)_BCS2                                                             |                           |
| CA_n7A-n28A-n78A          | CA_n7A-n78A <sup>7</sup><br>CA_n28A-n78A <sup>7</sup>         | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                               | 0                         |
|                           |                                                               | n28     | 5, 10, 15, 20                                                               |                           |
|                           |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100                                 |                           |
|                           |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100                                 |                           |
|                           | CA_n7A-n28A<br>CA_n7A-n78A<br>CA_n28A-n78A                    | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                               | 1                         |
|                           |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70 <sup>4</sup> , 80, 90, 100               |                           |
| CA_n7B-n28A-n78A          | CA_n7A-n78A <sup>7</sup><br>CA_n28A-n78A <sup>7</sup>         | n7      | CA_n7B_BCS0                                                                 | 0                         |
|                           |                                                               | n28     | 5, 10, 15, 20                                                               |                           |
|                           |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100                                 |                           |
|                           | CA_n7A-n28A<br>CA_n7A-n78A<br>CA_n28A-n78A<br>CA_n7B          | n7      | CA_n7B_BCS0                                                                 | 1                         |
|                           |                                                               | n7      | CA_n7B_BCS0                                                                 |                           |

| NR CA configuration    | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                              | Bandwidth combination set |
|------------------------|---------------------------------------------------------------|---------|---------------------------------------------------------------|---------------------------|
|                        |                                                               | n28     | 5, 10, 15, 20                                                 |                           |
|                        |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70 <sup>4</sup> , 80, 90, 100 |                           |
| CA_n7A-n40A-n78A       | CA_n7A-n40A<br>CA_n7A-n78A<br>CA_n40A-n78A                    | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                 | 0                         |
|                        |                                                               | n40     | 5, 10, 15, 20, 30, 40, 50, 60, 80                             |                           |
|                        |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100               |                           |
| CA_n7A-n46A-n78A       | CA_n7A-n46A<br>CA_n7A-n78A<br>CA_n46A-n78A                    | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                 | 0                         |
|                        |                                                               | n46     | 20, 40, 60, 80                                                |                           |
|                        |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100               |                           |
| CA_n7A-n46C-n78A       | CA_n7A-n46A<br>CA_n7A-n78A<br>CA_n46A-n78A                    | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                 | 0                         |
|                        |                                                               | n46     | CA_n46C_BCS0                                                  |                           |
|                        |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100               |                           |
| CA_n7A-n46D-n78A       | CA_n7A-n46A<br>CA_n7A-n78A<br>CA_n46A-n78A                    | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                 | 0                         |
|                        |                                                               | n46     | CA_n46D_BCS0                                                  |                           |
|                        |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100               |                           |
| CA_n7A-n66A-n77A       | CA_n7A-n66A<br>CA_n7A-n77A<br>CA_n66A-n77A                    | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                 | 0                         |
|                        |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                                     |                           |
|                        |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100               |                           |
| CA_n7A-n66(2A)-n77A    | CA_n7A-n66A<br>CA_n7A-n77A<br>CA_n66A-n77A                    | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                 | 0                         |
|                        |                                                               | n66     | CA_n66(2A)_BCS1                                               |                           |
|                        |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100               |                           |
| CA_n7A-n66A-n77(2A)    | CA_n7A-n66A<br>CA_n7A-n77A<br>CA_n66A-n77A                    | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                 | 0                         |
|                        |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                                     |                           |
|                        |                                                               | n77     | CA_n77(2A)_BCS1                                               |                           |
| CA_n7A-n66(2A)-n77(2A) | CA_n7A-n66A<br>CA_n7A-n77A<br>CA_n66A-n77A                    | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                 | 0                         |
|                        |                                                               | n66     | CA_n66(2A)_BCS1                                               |                           |
|                        |                                                               | n77     | CA_n77(2A)_BCS1                                               |                           |
| CA_n7(2A)-n66A-n77A    | CA_n7A-n66A<br>CA_n7A-n77A<br>CA_n66A-n77A                    | n7      | CA_n7(2A)_BCS0                                                | 0                         |
|                        |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                                     |                           |
|                        |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100               |                           |
| CA_n7(2A)-n66(2A)-n77A | CA_n7A-n66A<br>CA_n7A-n77A<br>CA_n66A-n77A                    | n7      | CA_n7(2A)_BCS0                                                | 0                         |
|                        |                                                               | n66     | CA_n66(2A)_BCS1                                               |                           |
|                        |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100               |                           |

| NR CA configuration       | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|---------------------------|---------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
| CA_n7(2A)-n66A-n77(2A)    | CA_n7A-n66A<br>CA_n7A-n77A<br>CA_n66A-n77A                    | n7      | CA_n7(2A)_BCS0                                  | 0                         |
|                           |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                           |                                                               | n77     | CA_n77(2A)_BCS1                                 |                           |
| CA_n7(2A)-n66(2A)-n77(2A) | CA_n7A-n66A<br>CA_n7A-n77A<br>CA_n66A-n77A                    | n7      | CA_n7(2A)_BCS0                                  | 0                         |
|                           |                                                               | n66     | CA_n66(2A)_BCS1                                 |                           |
|                           |                                                               | n77     | CA_n77(2A)_BCS1                                 |                           |
| CA_n7A-n66A-n78A          | CA_n7A-n66A<br>CA_n7A-n78A<br>CA_n66A-n78A                    | n7      | 5, 10, 15, 20, 25, 30, 40, 50                   | 0                         |
|                           |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                           |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100     |                           |
|                           |                                                               | n7      | 5, 10, 15, 20, 25, 30, 40, 50                   | 1                         |
|                           |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                           |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n7A-n66A-n78(2A)       | CA_n7A-n66A<br>CA_n7A-n78A<br>CA_n66A-n78A                    | n7      | 5, 10, 15, 20, 25, 30, 40, 50                   | 0                         |
|                           |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                           |                                                               | n78     | CA_n78(2A)_BCS1                                 |                           |
|                           |                                                               | n7      | 5, 10, 15, 20, 25, 30, 40, 50                   | 1                         |
|                           |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                           |                                                               | n78     | CA_n78(2A)_BCS2                                 |                           |
| CA_n7(2A)-n66A-n78A       | CA_n7A-n66A<br>CA_n7A-n78A<br>CA_n66A-n78A                    | n7      | CA_n7(2A)_BCS0                                  | 0                         |
|                           |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                           |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n7A-n66(2A)-n78A       | CA_n7A-n66A<br>CA_n7A-n78A<br>CA_n66A-n78A                    | n7      | 5, 10, 15, 20, 25, 30, 40, 50                   | 0                         |
|                           |                                                               | n66     | CA_n66(2A)_BCS1                                 |                           |
|                           |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n7(2A)-n66(2A)-n78A    | CA_n7A-n66A<br>CA_n7A-n78A<br>CA_n66A-n78A                    | n7      | CA_n7(2A)_BCS0                                  | 0                         |
|                           |                                                               | n66     | CA_n66(2A)_BCS1                                 |                           |
|                           |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n7A-n66(2A)-n78(2A)    | -                                                             | n7      | 5, 10, 15, 20, 25, 30, 40, 50                   | 0                         |
|                           |                                                               | n66     | CA_n66(2A)_BCS1                                 |                           |
|                           |                                                               | n78     | CA_n78(2A)_BCS2                                 |                           |
| CA_n7(2A)-n66A-n78(2A)    | CA_n7A-n66A<br>CA_n7A-n78A<br>CA_n66A-n78A                    | n7      | CA_n7(2A)_BCS0                                  | 0                         |
|                           |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                           |                                                               | n78     | CA_n78(2A)_BCS2                                 |                           |
| CA_n7(2A)-n66(2A)-n78(2A) | CA_n7A-n66A<br>CA_n7A-n78A<br>CA_n66A-n78A                    | n7      | CA_n7(2A)_BCS0                                  | 0                         |
|                           |                                                               | n66     | CA_n66(2A)_BCS1                                 |                           |
|                           |                                                               | n78     | CA_n78(2A)_BCS2                                 |                           |
| CA_n8A-n28A-n78A          | -                                                             | n8      | 5, 10, 15, 20                                   | 0                         |
|                           |                                                               | n28     | 5, 10, 15, 20                                   |                           |
|                           |                                                               | n28     | 5, 10, 15, 20                                   |                           |

| NR CA configuration  | Uplink CA configuration or single uplink carrier <sup>6</sup>                               | NR Band | Channel bandwidth (MHz) (NOTE 3)                   | Bandwidth combination set |
|----------------------|---------------------------------------------------------------------------------------------|---------|----------------------------------------------------|---------------------------|
|                      |                                                                                             | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100    |                           |
| CA_n8A-n38A-n40A     | -                                                                                           | n8      | 5, 10, 15, 20                                      | 0                         |
|                      |                                                                                             | n38     | 5, 10, 15, 20, 25, 30, 40                          |                           |
|                      |                                                                                             | n40     | 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n8A-n39A-n41A     | -                                                                                           | n8      | 5, 10, 15, 20                                      | 0                         |
|                      |                                                                                             | n39     | 5, 10, 15, 20, 25, 30, 40                          |                           |
|                      |                                                                                             | n41     | 10, 15, 20, 40, 50, 60, 80, 100                    |                           |
|                      |                                                                                             | n8      | 5, 10, 15, 20                                      | 1                         |
|                      |                                                                                             | n39     | 5, 10, 15, 20, 25, 30, 40                          |                           |
|                      |                                                                                             | n41     | 10, 15, 20, 40, 50, 60                             |                           |
| CA_n8A-n39A-n79A     | -                                                                                           | n8      | 5, 10, 15, 20                                      | 0                         |
|                      |                                                                                             | n39     | 5, 10, 15, 20, 25, 30, 40                          |                           |
|                      |                                                                                             | n79     | 40, 50, 60, 80, 100                                |                           |
| CA_n8A-n40A-n41A     | CA_n8A-n40A<br>CA_n8A-n41A<br>CA_n40A-n41A                                                  | n8      | 5, 10, 15, 20                                      | 0                         |
|                      |                                                                                             | n40     | 5, 10, 15, 20, 25, 30, 40, 50, 60, 80              |                           |
|                      |                                                                                             | n41     | 10, 15, 20, 40, 50, 60, 80, 90, 100                |                           |
| CA_n8A-n40A-n78A     | CA_n8A-n40A<br>CA_n8A-n78A<br>CA_n40A-n78A                                                  | n8      | 5, 10, 15, 20                                      | 0                         |
|                      |                                                                                             | n40     | 5, 10, 15, 20, 30, 40, 50, 60, 80                  |                           |
|                      |                                                                                             | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100    |                           |
| CA_n8A-n41A-n79A     | -                                                                                           | n8      | 5, 10, 15, 20                                      | 0                         |
|                      |                                                                                             | n41     | 10, 15, 20, 40, 50, 60, 80, 100                    |                           |
|                      |                                                                                             | n79     | 40, 50, 60, 80, 100                                |                           |
|                      |                                                                                             | n8      | 5, 10, 15, 20                                      | 1                         |
|                      |                                                                                             | n41     | 10, 15, 20, 40, 50, 60                             |                           |
|                      |                                                                                             | n79     | 40, 50, 60, 80, 100                                |                           |
| CA_n8A-n78A-n79A     | -                                                                                           | n8      | 5, 10, 15, 20                                      | 0                         |
|                      |                                                                                             | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100        |                           |
|                      |                                                                                             | n79     | 40, 50, 60, 80, 100                                |                           |
| CA_n8A-n78(2A)-n79A  | -                                                                                           | n8      | 5, 10, 15, 20                                      | 0                         |
|                      |                                                                                             | n78     | CA_n78(2A)_BCS1                                    |                           |
|                      |                                                                                             | n79     | 40, 50, 60, 80, 100                                |                           |
| CA_n12A-n30A-n66A    | CA_n12A-n30A<br>CA_n12A-n66A<br>CA_n30A-n66A                                                | n12     | 5, 10, 15                                          | 0                         |
|                      |                                                                                             | n30     | 5, 10                                              |                           |
|                      |                                                                                             | n66     | 5, 10, 15, 20, 25, 30, 40                          |                           |
| CA_n12A-n30A-n66(2A) | CA_n12A-n30A<br>CA_n12A-n66A<br>CA_n30A-n66A                                                | n12     | 5, 10, 15                                          | 0                         |
|                      |                                                                                             | n30     | 5, 10                                              |                           |
|                      |                                                                                             | n66     | CA_n66(2A)_BCS1                                    |                           |
| CA_n12A-n30A-n66(3A) | CA_n12A-n30A<br>CA_n12A-n66A<br>CA_n30A-n66A                                                | n12     | 5, 10, 15                                          | 0                         |
|                      |                                                                                             | n30     | 5, 10                                              |                           |
|                      |                                                                                             | n66     | CA_n66(3A)_BCS0                                    |                           |
| CA_n12A-n30A-n77A    | n77 <sup>7</sup><br>CA_n12A-n30A,<br>CA_n12A-n77A <sup>7</sup><br>CA_n30A-n77A <sup>7</sup> | n12     | 5, 10                                              | 0                         |
|                      |                                                                                             | n30     | 5, 10                                              |                           |
|                      |                                                                                             | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100    |                           |

| NR CA configuration  | Uplink CA configuration or single uplink carrier <sup>6</sup>                              | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|----------------------|--------------------------------------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
| CA_n12A-n30A-n77(2A) | n77 <sup>7</sup><br>CA_n12A-n30A<br>CA_n12A-n77A <sup>7</sup><br>CA_n30A-n77A <sup>7</sup> | n12     | 5, 10                                           | 0                         |
|                      |                                                                                            | n30     | 5, 10                                           |                           |
|                      |                                                                                            | n77     | CA_n77(2A)_BCS1                                 |                           |
| CA_n12A-n66A-n77A    | n77 <sup>7</sup><br>CA_n12A-n66A<br>CA_n12A-n77A <sup>7</sup><br>CA_n66A-n77A <sup>7</sup> | n12     | 5, 10, 15                                       | 0                         |
|                      |                                                                                            | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                      |                                                                                            | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n12A-n66(2A)-n77A | n77 <sup>7</sup><br>CA_n12A-n66A<br>CA_n12A-n77A <sup>7</sup><br>CA_n66A-n77A <sup>7</sup> | n12     | 5, 10, 15                                       | 0                         |
|                      |                                                                                            | n66     | CA_n66(2A)_BCS1                                 |                           |
|                      |                                                                                            | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n12A-n66A-n77(2A) | n77 <sup>7</sup><br>CA_n12A-n66A<br>CA_n12A-n77A <sup>7</sup><br>CA_n66A-n77A <sup>7</sup> | n12     | 5, 10, 15                                       | 0                         |
|                      |                                                                                            | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                      |                                                                                            | n77     | CA_n77(2A)_BCS1                                 |                           |
| CA_n13A-n25A-n66A    | CA_n13A-n25A<br>CA_n13A-n66A<br>CA_n25A-n66A                                               | n13     | 5, 10                                           | 0                         |
|                      |                                                                                            | n25     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                      |                                                                                            | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
| CA_n13A-n25A-n77A    | -                                                                                          | n13     | 5, 10                                           | 0                         |
|                      |                                                                                            | n25     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                      |                                                                                            | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n13A-n66A-n77A    | n77 <sup>7,9</sup>                                                                         | n13     | 5, 10                                           | 0                         |
|                      |                                                                                            | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                      |                                                                                            | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n14A-n30A-n66A    | CA_n14A-n30A<br>CA_n14A-n66A<br>CA_n30A-n66A                                               | n14     | 5, 10                                           | 0                         |
|                      |                                                                                            | n30     | 5, 10                                           |                           |
|                      |                                                                                            | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
| CA_n14A-n30A-n66(2A) | CA_n14A-n30A<br>CA_n14A-n66A<br>CA_n30A-n66A                                               | n14     | 5, 10                                           | 0                         |
|                      |                                                                                            | n30     | 5, 10                                           |                           |
|                      |                                                                                            | n66     | CA_n66(2A)_BCS1                                 |                           |
| CA_n14A-n30A-n66(3A) | CA_n14A-n30A<br>CA_n14A-n66A<br>CA_n30A-n66A                                               | n14     | 5, 10                                           | 0                         |
|                      |                                                                                            | n30     | 5, 10                                           |                           |
|                      |                                                                                            | n66     | CA_n66(3A)_BCS0                                 |                           |
| CA_n14A-n30A-n77A    | n77 <sup>7</sup><br>CA_n14A-n30A<br>CA_n14A-n77A <sup>7</sup><br>CA_n30A-n77A <sup>7</sup> | n14     | 5, 10                                           | 0                         |
|                      |                                                                                            | n30     | 5, 10                                           |                           |
|                      |                                                                                            | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |

| NR CA configuration  | Uplink CA configuration or single uplink carrier <sup>6</sup>                              | NR Band | Channel bandwidth (MHz) (NOTE 3)                                                                                                    | Bandwidth combination set |
|----------------------|--------------------------------------------------------------------------------------------|---------|-------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| CA_n14A-n30A-n77(2A) | n77 <sup>7</sup><br>CA_n14A-n30A<br>CA_n14A-n77A <sup>7</sup><br>CA_n30A-n77A <sup>7</sup> | n14     | 5, 10                                                                                                                               | 0                         |
|                      |                                                                                            | n30     | 5, 10                                                                                                                               |                           |
|                      |                                                                                            | n77     | CA_n77(2A)_BCS1                                                                                                                     |                           |
| CA_n14A-n66A-n77A    | n77 <sup>7</sup><br>CA_n14A-n66A<br>CA_n14A-n77A <sup>7</sup><br>CA_n66A-n77A <sup>7</sup> | n14     | 5, 10                                                                                                                               | 0                         |
|                      |                                                                                            | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                           |                           |
|                      |                                                                                            | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                     |                           |
| CA_n14A-n66(2A)-n77A | n77 <sup>7</sup><br>CA_n14A-n66A<br>CA_n14A-n77A <sup>7</sup><br>CA_n66A-n77A <sup>7</sup> | n14     | 5, 10                                                                                                                               | 0                         |
|                      |                                                                                            | n66     | CA_n66(2A)_BCS1                                                                                                                     |                           |
|                      |                                                                                            | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                     |                           |
| CA_n14A-n66A-n77(2A) | n77 <sup>7</sup><br>CA_n14A-n66A<br>CA_n14A-n77A <sup>7</sup><br>CA_n66A-n77A <sup>7</sup> | n14     | 5, 10                                                                                                                               | 0                         |
|                      |                                                                                            | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                           |                           |
|                      |                                                                                            | n77     | CA_n77(2A)_BCS1                                                                                                                     |                           |
| CA_n18A-n28A-n41A    | CA_n18A-n28A<br>CA_n18A-n41A<br>CA_n28A-n41A                                               | n18     | 5, 10, 15                                                                                                                           | 0                         |
|                      |                                                                                            | n28     | 5, 10                                                                                                                               |                           |
|                      |                                                                                            | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100                                                                                             |                           |
| CA_n18A-n28A-n77A    | CA_n18A-n28A<br>CA_n18A-n77A<br>CA_n28A-n77A                                               | n18     | 5, 10, 15                                                                                                                           | 0                         |
|                      |                                                                                            | n28     | 5, 10                                                                                                                               |                           |
|                      |                                                                                            | n77     | 10, 15, 20, 40, 50, 60, 80, 90, 100                                                                                                 |                           |
| CA_n18A-n28A-n77(2A) | CA_n18A-n28A<br>CA_n18A-n77A<br>CA_n28A-n77A                                               | n18     | 5, 10, 15                                                                                                                           | 0                         |
|                      |                                                                                            | n28     | 5, 10                                                                                                                               |                           |
|                      |                                                                                            | n77     | CA_n77(2A)_BCS1                                                                                                                     |                           |
| CA_n18A-n41A-n77A    | CA_n18A-n41A<br>CA_n18A-n77A<br>CA_n41A-n77A                                               | n18     | 5, 10, 15                                                                                                                           | 0                         |
|                      |                                                                                            | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100                                                                                             |                           |
|                      |                                                                                            | n77     | 10, 15, 20, 40, 50, 60, 80, 90, 100                                                                                                 |                           |
| CA_n18A-n41A-n77(2A) | CA_n18A-n41A<br>CA_n18A-n77A<br>CA_n41A-n77A                                               | n18     | 5, 10, 15                                                                                                                           | 0                         |
|                      |                                                                                            | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100                                                                                             |                           |
|                      |                                                                                            | n77     | CA_n77(2A)_BCS1                                                                                                                     |                           |
| CA_n20A-n28A-n78A    | -                                                                                          | n20     | 5, 10, 15, 20                                                                                                                       | 0                         |
|                      |                                                                                            | n28     | 5, 10, 15, 20                                                                                                                       |                           |
|                      |                                                                                            | n78     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100                                                                                             |                           |
| CA_n24A-n41A-n48A    | CA_n24A-n41A<br>CA_n24A-n48A<br>CA_n41A-n48A                                               | n24     | 5, 10                                                                                                                               | 0                         |
|                      |                                                                                            | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100                                                                                             |                           |
|                      |                                                                                            | n48     | 5, 10, 15, 20, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> |                           |

| NR CA configuration     | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                                                                                                    | Bandwidth combination set |
|-------------------------|---------------------------------------------------------------|---------|-------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| CA_n24A-n41(2A)-n48A    | CA_n24A-n41A<br>CA_n24A-n48A<br>CA_n41A-n48A                  | n24     | 5, 10                                                                                                                               | 0                         |
|                         |                                                               | n41     | CA_n41(2A)_BCS1                                                                                                                     |                           |
|                         |                                                               | n48     | 5, 10, 15, 20, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> |                           |
| CA_n24A-n41A-n48(2A)    | CA_n24A-n41A<br>CA_n24A-n48A<br>CA_n41A-n48A                  | n24     | 5, 10                                                                                                                               | 0                         |
|                         |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100                                                                                             |                           |
|                         |                                                               | n48     | CA_n48(2A)_BCS0                                                                                                                     |                           |
| CA_n24A-n41(2A)-n48(2A) | CA_n24A-n41A<br>CA_n24A-n48A<br>CA_n41A-n48A                  | n24     | 5, 10                                                                                                                               | 0                         |
|                         |                                                               | n41     | CA_n41(2A)_BCS1                                                                                                                     |                           |
|                         |                                                               | n48     | CA_n48(2A)_BCS0                                                                                                                     |                           |
| CA_n24A-n41A-n77A       | CA_n24A-n41A<br>CA_n24A-n77A<br>CA_n41A-n77A                  | n24     | 5, 10                                                                                                                               | 0                         |
|                         |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100                                                                                             |                           |
|                         |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                     |                           |
| CA_n24A-n41(2A)-n77A    | CA_n24A-n41A<br>CA_n24A-n77A<br>CA_n41A-n77A                  | n24     | 5, 10                                                                                                                               | 0                         |
|                         |                                                               | n41     | CA_n41(2A)_BCS1                                                                                                                     |                           |
|                         |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                     |                           |
|                         |                                                               | n24     | 5, 10                                                                                                                               | 1                         |
|                         |                                                               | n41     | CA_n41(2A)_BCS1                                                                                                                     |                           |
|                         |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                     |                           |
| CA_n24A-n41A-n77(2A)    | CA_n24A-n41A<br>CA_n24A-n77A<br>CA_n41A-n77A                  | n24     | 5, 10                                                                                                                               | 0                         |
|                         |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100                                                                                             |                           |
|                         |                                                               | n77     | CA_n77(2A)_BCS0                                                                                                                     |                           |
|                         |                                                               | n24     | 5, 10                                                                                                                               | 1                         |
|                         |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100                                                                                             |                           |
|                         |                                                               | n77     | CA_n77(2A)_BCS0                                                                                                                     |                           |
| CA_n24A-n41(2A)-n77(2A) | CA_n24A-n41A<br>CA_n24A-n77A<br>CA_n41A-n77A                  | n24     | 5, 10                                                                                                                               | 0                         |
|                         |                                                               | n41     | CA_n41(2A)_BCS1                                                                                                                     |                           |
|                         |                                                               | n77     | CA_n77(2A)_BCS0                                                                                                                     |                           |
|                         |                                                               | n24     | 5, 10                                                                                                                               | 1                         |
|                         |                                                               | n41     | CA_n41(2A)_BCS1                                                                                                                     |                           |
|                         |                                                               | n77     | CA_n77(2A)_BCS0                                                                                                                     |                           |
| CA_n24A-n48A-n77A       |                                                               | n24     | 5, 10                                                                                                                               | 0                         |
|                         |                                                               | n48     | 5, 10, 15, 20, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup>                    |                           |
|                         |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                     |                           |
| CA_n24A-n48(2A)-n77A    |                                                               | n24     | 5, 10                                                                                                                               | 0                         |
|                         |                                                               | n48     | CA_n48(2A)_BCS0                                                                                                                     |                           |
|                         |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                     |                           |
| CA_n24A-n48A-n77(2A)    |                                                               | n24     | 5, 10                                                                                                                               | 0                         |
|                         |                                                               | n48     | 5, 10, 15, 20, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> |                           |

| NR CA configuration     | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|-------------------------|---------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
|                         |                                                               | n77     | CA n77(2A) BCS0                                 |                           |
| CA_n24A-n48(2A)-n77(2A) |                                                               | n24     | 5, 10                                           | 0                         |
|                         |                                                               | n48     | CA_n48(2A) BCS0                                 |                           |
|                         |                                                               | n77     | CA_n77(2A) BCS0                                 |                           |
|                         |                                                               |         |                                                 |                           |
| CA_n25A-n29A-n66A       | CA_n25A-n66A                                                  | n25     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                         |                                                               | n29     | 5, 10                                           |                           |
|                         |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
| CA_n25A-n38A-n66A       | CA_n25A-n38A<br>CA_n25A-n66A<br>CA_n38A-n66A                  | n25     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                         |                                                               | n38     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                         |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
| CA_n25(2A)-n38A-n66A    | CA_n25A-n38A<br>CA_n25A-n66A<br>CA_n38A-n66A                  | n25     | CA_n25(2A)_BCS0                                 | 0                         |
|                         |                                                               | n38     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                         |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
| CA_n25(2A)-n38A-n66(2A) | CA_n25A-n38A<br>CA_n25A-n66A<br>CA_n38A-n66A                  | n25     | CA_n25(2A)_BCS0                                 | 0                         |
|                         |                                                               | n38     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                         |                                                               | n66     | CA_n66(2A) BCS1                                 |                           |
| CA_n25A-n38A-n66(2A)    | CA_n25A-n38A<br>CA_n25A-n66A<br>CA_n38A-n66A                  | n25     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                         |                                                               | n38     | 5, 10, 15, 20                                   |                           |
|                         |                                                               | n66     | CA_n66(2A) BCS1                                 |                           |
| CA_n25A-n38A-n78A       | CA_n25A-n38A<br>CA_n25A-n78A<br>CA_n38A-n78A                  | n25     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                         |                                                               | n38     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                         |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n25A-n38A-n78(2A)    | CA_n25A-n38A<br>CA_n25A-n78A<br>CA_n38A-n78A                  | n25     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                         |                                                               | n38     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                         |                                                               | n78     | CA_n78(2A) BCS2                                 |                           |
| CA_n25(2A)-n38A-n78A    | CA_n25A-n38A<br>CA_n25A-n78A<br>CA_n38A-n78A                  | n25     | CA_n25(2A)_BCS0                                 | 0                         |
|                         |                                                               | n38     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                         |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n25(2A)-n38A-n78(2A) | CA_n25A-n38A<br>CA_n25A-n78A<br>CA_n38A-n78A                  | n25     | CA_n25(2A)_BCS0                                 | 0                         |
|                         |                                                               | n38     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                         |                                                               | n78     | CA_n78(2A) BCS2                                 |                           |
| CA_n25A-n41A-n66A       | -                                                             | n25     | 5, 10, 15, 20                                   | 0                         |
|                         |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100         |                           |
|                         |                                                               | n66     | 5, 10, 15, 20, 40                               |                           |
|                         | CA_n25A-n41A<br>CA_n25A-n66A<br>CA_n41A-n66A                  | n25     | 5, 10, 15, 20, 25, 30, 40                       | 1                         |
|                         |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100     |                           |
|                         |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                         | CA_n25A-n41A<br>CA_n25A-n66A                                  | n25     | n25 channel bandwidths in Table 5.3.5-1         | 4 and 5                   |
|                         |                                                               |         |                                                 |                           |
|                         |                                                               |         |                                                 |                           |
|                         |                                                               |         |                                                 |                           |



| NR CA configuration  | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)            | Bandwidth combination set |
|----------------------|---------------------------------------------------------------|---------|---------------------------------------------|---------------------------|
|                      | CA_n41A-n66A                                                  |         |                                             |                           |
|                      |                                                               | n41     | n41 channel bandwidths in Table 5.3.5-1     |                           |
|                      |                                                               | n66     | n66 channel bandwidths in Table 5.3.5-1     |                           |
| CA_n25A-n41A-n66(2A) | -                                                             | n25     | 5, 10, 15, 20                               | 0                         |
|                      |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                      |                                                               | n66     | CA_n66(2A)_BCS1                             |                           |
|                      | CA_n25A-n41A<br>CA_n25A-n66A<br>CA_n41A-n66A                  | n25     | 5, 10, 15, 20, 25, 30, 40                   | 1                         |
|                      |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                      |                                                               | n66     | CA_n66(2A)_BCS1                             |                           |
|                      | CA_n25A-n41A<br>CA_n25A-n66A<br>CA_n41A-n66A                  | n25     | n25 channel bandwidths in Table 5.3.5-1     | 4 and 5                   |
|                      |                                                               | n41     | n41 channel bandwidths in Table 5.3.5-1     |                           |
|                      |                                                               | n66     | CA_n66(2A)_BCS 4 and 5                      |                           |
| CA_n25A-n41C-n66A    | -                                                             | n25     | 5, 10, 15, 20                               | 0                         |
|                      |                                                               | n41     | CA_n41C_BCS0                                |                           |
|                      |                                                               | n66     | 5, 10, 15, 20, 40                           |                           |
|                      | CA_n25A-n41A<br>CA_n25A-n66A<br>CA_n41A-n66A                  | n25     | 5, 10, 15, 20, 25, 30, 40                   | 1                         |
|                      |                                                               | n41     | CA_n41C_BCS1                                |                           |
|                      |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                   |                           |
|                      | CA_n25A-n41A<br>CA_n25A-n66A<br>CA_n41A-n66A                  | n25     | n25 channel bandwidths in Table 5.3.5-1     | 4 and 5                   |
|                      |                                                               | n41     | CA_n41C_BCS 4 and 5                         |                           |
|                      |                                                               | n66     | n66 channel bandwidths in Table 5.3.5-1     |                           |
| CA_n25A-n41(2A)-n66A | -                                                             | n25     | 5, 10, 15, 20                               | 0                         |
|                      |                                                               | n41     | CA_n41(2A)_BCS1                             |                           |
|                      |                                                               | n66     | 5, 10, 15, 20, 40                           |                           |
|                      | CA_n25A-n41A<br>CA_n25A-n66A<br>CA_n41A-n66A                  | n25     | 5, 10, 15, 20, 25, 30, 40                   | 1                         |
|                      |                                                               | n41     | CA_n41(2A)_BCS1                             |                           |
|                      |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                   |                           |
|                      | CA_n25A-n41A<br>CA_n25A-n66A<br>CA_n41A-n66A                  | n25     | n25 channel bandwidths in Table 5.3.5-1     | 4 and 5                   |
|                      |                                                               | n41     | CA_n41(2A)_BCS 4 and 5                      |                           |
|                      |                                                               | n66     | n66 channel bandwidths in Table 5.3.5-1     |                           |
| CA_n25(2A)-n41A-n66A | -                                                             | n25     | CA_n25(2A)_BCS1                             | 0                         |
|                      |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                      |                                                               | n66     | 5, 10, 15, 20, 40                           |                           |
|                      | CA_n25A-n41A<br>CA_n25A-n66A<br>CA_n41A-n66A                  | n25     | CA_n25(2A)_BCS1                             | 1                         |
|                      |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                      |                                                               | n66     | 5, 10, 15, 20, 30, 40                       |                           |

| NR CA configuration  | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)            | Bandwidth combination set |
|----------------------|---------------------------------------------------------------|---------|---------------------------------------------|---------------------------|
|                      | CA_n25A-n41A<br>CA_n25A-n66A<br>CA_n41A-n66A                  | n25     | CA_n25(2A)_BCS 4 and 5                      | 4 and 5                   |
|                      |                                                               | n41     | n41 channel bandwidths in Table 5.3.5-1     |                           |
|                      |                                                               | n66     | n66 channel bandwidths in Table 5.3.5-1     |                           |
| CA_n25A-n41A-n71A    | -                                                             | n25     | 5, 10, 15, 20                               | 0                         |
|                      |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100     |                           |
|                      |                                                               | n71     | 5, 10, 15, 20                               |                           |
|                      | CA_n25A-n41A<br>CA_n25A-n71A<br>CA_n41A-n71A                  | n25     | 5, 10, 15, 20, 25, 30, 40                   | 1                         |
|                      |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                      |                                                               | n71     | 5, 10, 15, 20                               |                           |
|                      | CA_n25A-n41A<br>CA_n25A-n71A<br>CA_n41A-n71A                  | n25     | n25 channel bandwidths in Table 5.3.5-1     | 4 and 5                   |
|                      |                                                               | n41     | n41 channel bandwidths in Table 5.3.5-1     |                           |
|                      |                                                               | n71     | n77 channel bandwidths in Table 5.3.5-1     |                           |
| CA_n25A-n41A-n71B    | -                                                             | n25     | 5, 10, 15, 20                               | 0                         |
|                      |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100     |                           |
|                      |                                                               | n71     | CA_n71B_BCS2                                |                           |
|                      | CA_n25A-n41A<br>CA_n25A-n71A<br>CA_n41A-n71A                  | n25     | 5, 10, 15, 20, 30, 40                       | 1                         |
|                      |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100     |                           |
|                      |                                                               | n71     | CA_n71B_BCS2                                |                           |
|                      | CA_n25A-n41A<br>CA_n25A-n71A<br>CA_n41A-n71A                  | n25     | n25 channel bandwidths in Table 5.3.5-1     | 4 and 5                   |
|                      |                                                               | n41     | n41 channel bandwidths in Table 5.3.5-1     |                           |
|                      |                                                               | n71     | CA_n71B_BCS 4 and 5                         |                           |
| CA_n25A-n41A-n71(2A) | -                                                             | n25     | 5, 10, 15, 20                               | 0                         |
|                      |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100     |                           |
|                      |                                                               | n71     | CA_n71(2A)_BCS0                             |                           |
|                      | CA_n25A-n41A<br>CA_n25A-n71A<br>CA_n41A-n71A                  | n25     | 5, 10, 15, 20, 30, 40                       | 1                         |
|                      |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100     |                           |
|                      |                                                               | n71     | CA_n71(2A)_BCS0                             |                           |
|                      | CA_n25A-n41A<br>CA_n25A-n71A<br>CA_n41A-n71A                  | n25     | n25 channel bandwidths in Table 5.3.5-1     | 4 and 5                   |
|                      |                                                               | n41     | n41 channel bandwidths in Table 5.3.5-1     |                           |
|                      |                                                               | n71     | CA_n71(2A)_BCS 4 and 5                      |                           |
| CA_n25A-n41(2A)-n71A | -                                                             | n25     | 5, 10, 15, 20                               | 0                         |
|                      |                                                               | n41     | CA_n41(2A)_BCS1                             |                           |
|                      |                                                               | n71     | 5, 10, 15, 20                               |                           |
|                      | CA_n25A-n41A<br>CA_n25A-n71A<br>CA_n41A-n71A                  | n25     | 5, 10, 15, 20, 25, 30, 40                   | 1                         |
|                      |                                                               | n41     | CA_n41(2A)_BCS1                             |                           |
|                      |                                                               | n71     | 5, 10, 15, 20                               |                           |

| NR CA configuration  | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|----------------------|---------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
|                      | CA_n25A-n41A<br>CA_n25A-n71A<br>CA_n41A-n71A                  | n25     | n25 channel bandwidths in Table 5.3.5-1         | 4 and 5                   |
|                      |                                                               | n41     | CA_n41(2A)_BCS 4 and 5                          |                           |
|                      |                                                               | n71     | n71 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n25A-n41C-n71A    | -                                                             | n25     | 5, 10, 15, 20                                   | 0                         |
|                      |                                                               | n41     | CA_n41C_BCS0                                    |                           |
|                      |                                                               | n71     | 5, 10, 15, 20                                   |                           |
|                      | CA_n25A-n41A<br>CA_n25A-n71A<br>CA_n41A-n71A                  | n25     | 5, 10, 15, 20, 25, 30, 40                       | 1                         |
|                      |                                                               | n41     | CA_n41C_BCS1                                    |                           |
|                      |                                                               | n71     | 5, 10, 15, 20                                   |                           |
|                      | CA_n25A-n41A<br>CA_n25A-n71A<br>CA_n41A-n71A<br>CA_n41C       | n25     | n25 channel bandwidths in Table 5.3.5-1         | 4 and 5                   |
|                      |                                                               | n41     | CA_n41C_BCS 4 and 5                             |                           |
|                      |                                                               | n71     | n71 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n25(2A)-n41A-n71A | -                                                             | n25     | CA_n25(2A)_BCS1                                 | 0                         |
|                      |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100         |                           |
|                      |                                                               | n71     | 5, 10, 15, 20                                   |                           |
|                      | CA_n25A-n41A<br>CA_n25A-n71A<br>CA_n41A-n71A                  | n25     | CA_n25(2A)_BCS1                                 | 1                         |
|                      |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100     |                           |
|                      |                                                               | n71     | 5, 10, 15, 20                                   |                           |
|                      | CA_n25A-n41A<br>CA_n25A-n71A<br>CA_n41A-n71A                  | n25     | CA_n25(2A)_BCS 4 and 5                          | 4 and 5                   |
|                      |                                                               | n41     | n41 channel bandwidths in Table 5.3.5-1         |                           |
|                      |                                                               | n71     | n71 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n25A-n41A-n77A    | CA_n25A-n41A<br>CA_n25A-n77A<br>CA_n41A-n77A                  | n25     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                      |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100         |                           |
|                      |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100     |                           |
|                      |                                                               | n25     | 5, 10, 15, 20, 25, 30, 40                       | 1                         |
|                      |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100         |                           |
|                      |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                      | CA_n25A-n41A<br>CA_n25A-n77A<br>CA_n41A-n77A                  | n25     | n25 channel bandwidths in Table 5.3.5-1         | 4 and 5                   |
|                      |                                                               | n41     | n41 channel bandwidths in Table 5.3.5-1         |                           |
|                      |                                                               | n77     | n77 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n25A-n41(2A)-n77A | CA_n25A-n41A<br>CA_n25A-n77A<br>CA_n41A-n77A                  | n25     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                      |                                                               | n41     | CA_n41(2A)_BCS1                                 |                           |

| NR CA configuration     | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|-------------------------|---------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
|                         |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 1                         |
|                         |                                                               | n25     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                         |                                                               | n41     | CA_n41(2A)_BCS1                                 |                           |
|                         |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100     |                           |
|                         | CA_n25A-n41A<br>CA_n25A-n77A<br>CA_n41A-n77A                  | n25     | n25 channel bandwidths in Table 5.3.5-1         | 4 and 5                   |
|                         |                                                               | n41     | CA_n41(2A)_BCS 4 and 5                          |                           |
|                         |                                                               | n77     | n77 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n25A-n41A-n77(2A)    | CA_n25A-n41A<br>CA_n25A-n77A<br>CA_n41A-n77A                  | n25     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                         |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100         |                           |
|                         |                                                               | n77     | CA_n77(2A)_BCS1                                 |                           |
|                         | CA_n25A-n41A<br>CA_n25A-n77A<br>CA_n41A-n77A                  | n25     | n25 channel bandwidths in Table 5.3.5-1         | 4 and 5                   |
|                         |                                                               | n41     | n41 channel bandwidths in Table 5.3.5-1         |                           |
|                         |                                                               | n77     | CA_n77(2A)_BCS 4 and 5                          |                           |
| CA_n25A-n41(2A)-n77(2A) | CA_n25A-n41A<br>CA_n25A-n77A<br>CA_n41A-n77A                  | n25     | n25 channel bandwidths in Table 5.3.5-1         | 4 and 5                   |
|                         |                                                               | n41     | CA_n41(2A)_BCS 4 and 5                          |                           |
|                         |                                                               | n77     | CA_n77(2A)_BCS 4 and 5                          |                           |
| CA_n25(2A)-n41A-n77A    | CA_n25A-n41A<br>CA_n25A-n77A<br>CA_n41A-n77A                  | n25     | CA_n25(2A)_BCS1                                 | 0                         |
|                         |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100     |                           |
|                         |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                         | CA_n25A-n41A<br>CA_n25A-n77A<br>CA_n41A-n77A                  | n25     | CA_n25(2A)_BCS 4 and 5                          | 4 and 5                   |
|                         |                                                               | n41     | n41 channel bandwidths in Table 5.3.5-1         |                           |
|                         |                                                               | n77     | n77 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n25A-n41C-n77A       | CA_n25A-n41A<br>CA_n25A-n77A<br>CA_n41A-n77A<br>CA_n41C       | n25     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                         |                                                               | n41     | CA_n41C_BCS0                                    |                           |
|                         |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                         |                                                               | n25     | 5, 10, 15, 20, 25, 30, 40                       | 1                         |
|                         |                                                               | n41     | CA_n41C_BCS2                                    |                           |
|                         |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                         | CA_n25A-n41A<br>CA_n25A-n77A<br>CA_n41A-n77A<br>CA_n41C       | n25     | n25 channel bandwidths in Table 5.3.5-1         | 4 and 5                   |
|                         |                                                               | n41     | CA_n41C_BCS 4 and 5                             |                           |
|                         |                                                               | n77     | n77 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n25A-n41C-n77(2A)    | CA_n25A-n41A<br>CA_n25A-n77A<br>CA_n41A-n77A<br>CA_n41C       | n25     | n25 channel bandwidths in Table 5.3.5-1         | 4 and 5                   |

| NR CA configuration  | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                                                                                 | Bandwidth combination set |
|----------------------|---------------------------------------------------------------|---------|------------------------------------------------------------------------------------------------------------------|---------------------------|
|                      |                                                               | n41     | CA_n41C_BCS 4 and 5                                                                                              |                           |
|                      |                                                               | n77     | CA_n77(2A)_BCS 4 and 5                                                                                           |                           |
| CA_n25A-n41A-n78A    | CA_n25A-n41A<br>CA_n25A-n78A<br>CA_n41A-n78A                  | n25     | 5, 10, 15, 20, 25, 30, 40                                                                                        | 0                         |
|                      |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100                                                                      |                           |
|                      |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                  |                           |
| CA_n25A-n41A-n78(2A) | CA_n25A-n41A<br>CA_n25A-n78A<br>CA_n41A-n78A                  | n25     | 5, 10, 15, 20, 25, 30, 40                                                                                        | 0                         |
|                      |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100                                                                      |                           |
|                      |                                                               | n78     | CA_n78(2A)_BCS2                                                                                                  |                           |
| CA_n25A-n48A-n66A    | CA_n25A-n48A<br>CA_n25A-n66A<br>CA_n48A-n66A                  | n25     | 5, 10, 15, 20                                                                                                    | 0                         |
|                      |                                                               | n48     | 5, 10, 15, 20, 40, 50                                                                                            |                           |
|                      |                                                               | n66     | 5, 10, 15, 20, 40                                                                                                |                           |
|                      |                                                               | n25     | 5, 10, 15, 20, 25, 30, 40                                                                                        | 1                         |
|                      |                                                               | n48     | 5, 10, 15, 20, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> |                           |
|                      |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                        |                           |
| CA_n25A-n48(2A)-n66A | CA_n25A-n48A<br>CA_n25A-n66A<br>CA_n48A-n66A                  | n25     | 5, 10, 15, 20                                                                                                    | 0                         |
|                      |                                                               | n48     | CA_n48(2A)_BCS0                                                                                                  |                           |
|                      |                                                               | n66     | 5, 10, 15, 20, 40                                                                                                |                           |
|                      |                                                               | n25     | 5, 10, 15, 20, 25, 30, 40                                                                                        | 1                         |
|                      |                                                               | n48     | CA_n48(2A)_BCS0                                                                                                  |                           |
|                      |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                        |                           |
| CA_n25A-n48C-n66A    | CA_n25A-n48A<br>CA_n25A-n66A<br>CA_n48A-n66A                  | n25     | 5, 10, 15, 20                                                                                                    | 0                         |
|                      |                                                               | n48     | CA_n48C_BCS0                                                                                                     |                           |
|                      |                                                               | n66     | 5, 10, 15, 20, 40                                                                                                |                           |
|                      |                                                               | n25     | 5, 10, 15, 20, 25, 30, 40                                                                                        | 1                         |
|                      |                                                               | n48     | CA_n48C_BCS0                                                                                                     |                           |
|                      |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                        |                           |
| CA_n25A-n66A-n71A    | -                                                             | n25     | 5, 10, 15, 20                                                                                                    | 0                         |
|                      |                                                               | n66     | 5, 10, 15, 20, 40                                                                                                |                           |
|                      |                                                               | n71     | 5, 10, 15, 20                                                                                                    |                           |
|                      | CA_n25A-n66A<br>CA_n25A-n71A<br>CA_n66A-n71A                  | n25     | 5, 10, 15, 20, 25, 30, 40                                                                                        | 1                         |
|                      |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                        |                           |
|                      |                                                               | n71     | 5, 10, 15, 20                                                                                                    |                           |
|                      | CA_n25A-n66A<br>CA_n25A-n71A<br>CA_n66A-n71A                  | n25     | n25 channel bandwidths in Table 5.3.5-1                                                                          | 4 and 5                   |
|                      |                                                               | n66     | n66 channel bandwidths in Table 5.3.5-1                                                                          |                           |
|                      |                                                               | n71     | n71 channel bandwidths in Table 5.3.5-1                                                                          |                           |
| CA_n25A-n66A-n71B    | CA_n25A-n66A<br>CA_n25A-n71A<br>CA_n66A-n71A                  | n25     | 5, 10, 15, 20, 25, 30, 40                                                                                        | 0                         |
|                      |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                        |                           |
|                      |                                                               | n71     | CA_n71B_BCS2                                                                                                     |                           |
|                      | CA_n25A-n66A<br>CA_n25A-n71A                                  | n25     | n25 channel bandwidths in Table 5.3.5-1                                                                          | 4 and 5                   |
|                      |                                                               |         |                                                                                                                  |                           |

| NR CA configuration  | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|----------------------|---------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
|                      | CA_n66A-n71A                                                  |         |                                                 |                           |
|                      |                                                               | n66     | n66 channel bandwidths in Table 5.3.5-1         |                           |
|                      |                                                               | n71     | CA_n71B_BCS 4 and 5                             |                           |
| CA_n25A-n66A-n71(2A) | CA_n25A-n66A<br>CA_n25A-n71A<br>CA_n66A-n71A                  | n25     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                      |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                      |                                                               | n71     | CA_n71(2A)_BCS0                                 |                           |
|                      | CA_n25A-n66A<br>CA_n25A-n71A<br>CA_n66A-n71A                  | n25     | n25 channel bandwidths in Table 5.3.5-1         | 4 and 5                   |
|                      |                                                               | n66     | n66 channel bandwidths in Table 5.3.5-1         |                           |
|                      |                                                               | n71     | CA_n71(2A)_BCS 4 and 5                          |                           |
| CA_n25A-n66(2A)-n71A | CA_n25A-n66A<br>CA_n25A-n71A<br>CA_n66A-n71A                  | n25     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                      |                                                               | n66     | CA_n66(2A)_BCS1                                 |                           |
|                      |                                                               | n71     | 5, 10, 15, 20                                   |                           |
|                      | CA_n25A-n66A<br>CA_n25A-n71A<br>CA_n66A-n71A                  | n25     | n25 channel bandwidths in Table 5.3.5-1         | 4 and 5                   |
|                      |                                                               | n66     | CA_n66(2A)_BCS 4 and 5                          |                           |
|                      |                                                               | n71     | n71 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n25(2A)-n66A-n71A | CA_n25A-n66A<br>CA_n25A-n71A<br>CA_n66A-n71A                  | n25     | CA_n25(2A)_BCS1                                 | 0                         |
|                      |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                      |                                                               | n71     | 5, 10, 15, 20                                   |                           |
|                      | CA_n25A-n66A<br>CA_n25A-n71A<br>CA_n66A-n71A                  | n25     | CA_n25(2A)_BCS 4 and 5                          | 4 and 5                   |
|                      |                                                               | n66     | n66 channel bandwidths in Table 5.3.5-1         |                           |
|                      |                                                               | n71     | n71 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n25A-n66A-n77A    | CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A                  | n25     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                      |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                      |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                      | CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A                  | n25     | n25 channel bandwidths in Table 5.3.5-1         | 4 and 5                   |
|                      |                                                               | n66     | n66 channel bandwidths in Table 5.3.5-1         |                           |
|                      |                                                               | n77     | n77 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n25A-n66(2A)-n77A | CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A                  | n25     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                      |                                                               | n66     | CA_n66(2A)_BCS1                                 |                           |
|                      |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                      | CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A                  | n25     | n25 channel bandwidths in Table 5.3.5-1         | 4 and 5                   |
|                      |                                                               | n66     | CA_n66(2A)_BCS 4 and 5                          |                           |
|                      |                                                               | n77     | n77 channel bandwidths in Table 5.3.5-1         |                           |

| NR CA configuration        | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|----------------------------|---------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
| CA_n25A-n66A-n77(2A)       | CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A                  | n25     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                            |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                            |                                                               | n77     | CA_n77(2A)_BCS1                                 |                           |
|                            | CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A                  | n25     | n25 channel bandwidths in Table 5.3.5-1         | 4 and 5                   |
|                            |                                                               | n66     | n66 channel bandwidths in Table 5.3.5-1         |                           |
|                            |                                                               | n77     | CA_n77(2A)_BCS 4 and 5                          |                           |
| CA_n25A-n66(2A)-n77(2A)    | CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A                  | n25     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                            |                                                               | n66     | CA_n66(2A)_BCS1                                 |                           |
|                            |                                                               | n77     | CA_n77(2A)_BCS1                                 |                           |
| CA_n25(2A)-n66A-n77A       | CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A                  | n25     | CA_n25(2A)_BCS0                                 | 0                         |
|                            |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                            |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                            | CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A                  | n25     | CA_n25(2A)_BCS 4 and 5                          | 4 and 5                   |
|                            |                                                               | n66     | n66 channel bandwidths in Table 5.3.5-1         |                           |
|                            |                                                               | n77     | n77 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n25(2A)-n66(2A)-n77A    | CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A                  | n25     | CA_n25(2A)_BCS0                                 | 0                         |
|                            |                                                               | n66     | CA_n66(2A)_BCS1                                 |                           |
|                            |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n25(2A)-n66A-n77(2A)    | CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A                  | n25     | CA_n25(2A)_BCS0                                 | 0                         |
|                            |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                            |                                                               | n77     | CA_n77(2A)_BCS1                                 |                           |
| CA_n25(2A)-n66(2A)-n77(2A) | CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A                  | n25     | CA_n25(2A)_BCS0                                 | 0                         |
|                            |                                                               | n66     | CA_n66(2A)_BCS1                                 |                           |
|                            |                                                               | n77     | CA_n77(2A)_BCS1                                 |                           |
| CA_n25A-n66A-n78A          | CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n66A-n78A                  | n25     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                            |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                            |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100     |                           |
|                            |                                                               | n25     | 5, 10, 15, 20, 25, 30, 40                       | 1                         |
|                            |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                            |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n25(2A)-n66A-n78A       | CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n66A-n78A                  | n25     | CA_n25(2A)_BCS0                                 | 0                         |
|                            |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                            |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |

| NR CA configuration        | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|----------------------------|---------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
| CA_n25A-n66(2A)-n78A       | CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n66A-n78A                  | n25     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                            |                                                               | n66     | CA_n66(2A)_BCS1                                 |                           |
|                            |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n25A-n66A-n78(2A)       | CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n66A-n78A                  | n25     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                            |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                            |                                                               | n78     | CA_n78(2A)_BCS2                                 |                           |
| CA_n25(2A)-n66(2A)-n78A    | CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n66A-n78A                  | n25     | CA_n25(2A)_BCS0                                 | 0                         |
|                            |                                                               | n66     | CA_n66(2A)_BCS1                                 |                           |
|                            |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n25(2A)-n66A-n78(2A)    | CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n66A-n78A                  | n25     | CA_n25(2A)_BCS0                                 | 0                         |
|                            |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                            |                                                               | n78     | CA_n78(2A)_BCS2                                 |                           |
| CA_n25A-n66(2A)-n78(2A)    | CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n66A-n78A                  | n25     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                            |                                                               | n66     | CA_n66(2A)_BCS1                                 |                           |
|                            |                                                               | n78     | CA_n78(2A)_BCS2                                 |                           |
| CA_n25(2A)-n66(2A)-n78(2A) | CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n66A-n78A                  | n25     | CA_n25(2A)_BCS0                                 | 0                         |
|                            |                                                               | n66     | CA_n66(2A)_BCS1                                 |                           |
|                            |                                                               | n78     | CA_n78(2A)_BCS2                                 |                           |
| CA_n25A-n71A-n77A          | CA_n25A-n71A<br>CA_n25A-n77A<br>CA_n71A-n77A                  | n25     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                            |                                                               | n71     | 5, 10, 15, 20                                   |                           |
|                            |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                            | CA_n25A-n71A<br>CA_n25A-n77A<br>CA_n71A-n77A                  | n25     | n25 channel bandwidths in Table 5.3.5-1         | 4 and 5                   |
|                            |                                                               | n71     | n71 channel bandwidths in Table 5.3.5-1         |                           |
|                            |                                                               | n77     | n77 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n25A-n71B-n77A          | CA_n25A-n71A<br>CA_n25A-n77A<br>CA_n71A-n77A                  | n25     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                            |                                                               | n71     | CA_n71B_BCS2                                    |                           |
|                            |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                            | CA_n25A-n71A<br>CA_n25A-n77A<br>CA_n71A-n77A                  | n25     | n25 channel bandwidths in Table 5.3.5-1         | 4 and 5                   |
|                            |                                                               | n71     | CA_n71B_BCS 4 and 5                             |                           |
|                            |                                                               | n77     | n77 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n25A-n71(2A)-n77A       | CA_n25A-n71A<br>CA_n25A-n77A<br>CA_n71A-n77A                  | n25     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                            |                                                               | n71     | CA_n71(2A)_BCS0                                 |                           |
|                            |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |



| NR CA configuration  | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|----------------------|---------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
|                      | CA_n25A-n71A<br>CA_n25A-n77A<br>CA_n71A-n77A                  | n25     | n25 channel bandwidths in Table 5.3.5-1         | 4 and 5                   |
|                      |                                                               | n71     | CA_n71(2A)_BCS 4 and 5                          |                           |
|                      |                                                               | n77     | n77 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n25(2A)-n71A-n77A | CA_n25A-n71A<br>CA_n25A-n77A<br>CA_n71A-n77A                  | n25     | CA_n25(2A)_BCS1                                 | 0                         |
|                      |                                                               | n71     | 5, 10, 15, 20                                   |                           |
|                      |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                      | CA_n25A-n71A<br>CA_n25A-n77A<br>CA_n71A-n77A                  | n25     | CA_n25(2A)_BCS 4 and 5                          | 4 and 5                   |
|                      |                                                               | n71     | n71 channel bandwidths in Table 5.3.5-1         |                           |
|                      |                                                               | n77     | n77 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n25A-n71A-n78A    | CA_n25A-n71A<br>CA_n25A-n78A<br>CA_n71A-n78A                  | n25     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                      |                                                               | n71     | 5, 10, 15, 20                                   |                           |
|                      |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n25A-n71A-n78(2A) | CA_n25A-n71A<br>CA_n25A-n78A<br>CA_n71A-n78A                  | n25     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                      |                                                               | n71     | 5, 10, 15, 20                                   |                           |
|                      |                                                               | n78     | CA_n78(2A)_BCS2                                 |                           |
| CA_n26A-n66A-n70A    | CA_n26A-n66A<br>CA_n26A-n70A                                  | n26     | 5, 10, 15, 20                                   | 0                         |
|                      |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                      |                                                               | n70     | 5, 10, 15, 20 <sup>1</sup> , 25 <sup>1</sup>    |                           |
| CA_n26A-n66(2A)-n70A | CA_n26A-n66A<br>CA_n26A-n70A                                  | n26     | 5, 10, 15, 20                                   | 0                         |
|                      |                                                               | n66     | CA_n66(2A)_BCS0                                 |                           |
|                      |                                                               | n70     | 5, 10, 15, 20 <sup>1</sup> , 25 <sup>1</sup>    |                           |
| CA_n28A-n38A-n78A    | -                                                             | n28     | 5, 10, 15, 20, 30                               | 0                         |
|                      |                                                               | n38     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                      |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n28A-n39A-n40A    | -                                                             | n28     | 5, 10, 15, 20, 30                               | 0                         |
|                      |                                                               | n39     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                      |                                                               | n40     | 5, 10, 15, 20, 25, 30, 40, 50, 60, 80, 100      |                           |
| CA_n28A-n39A-n41A    | CA_n28A-n39A<br>CA_n28A-n41A<br>CA_n39A-n41A                  | n28     | 5, 10, 15, 20, 30                               | 0                         |
|                      |                                                               | n39     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                      |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100     |                           |
| CA_n28A-n39A-n41C    | CA_n28A-n39A<br>CA_n28A-n41A<br>CA_n39A-n41A                  | n28     | 5, 10, 15, 20, 30                               | 0                         |
|                      |                                                               | n39     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                      |                                                               | n41     | CA_n41C_BCS1                                    |                           |
| CA_n28A-n39A-n79A    | -                                                             | n28     | 5, 10, 15, 20, 30                               | 0                         |
|                      |                                                               | n39     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                      |                                                               | n79     | 40, 50, 60, 80, 100                             |                           |

| NR CA configuration  | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)               | Bandwidth combination set |
|----------------------|---------------------------------------------------------------|---------|------------------------------------------------|---------------------------|
| CA_n28A-n40A-n41A    | CA_n28A-n40A<br>CA_n28A-n41A<br>CA_n40A-n41A                  | n28     | 5, 10, 15, 20, 30                              | 0                         |
|                      |                                                               | n40     | 5, 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100 |                           |
|                      |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100    |                           |
| CA_n28A-n40A-n78A    | CA_n28A-n40A<br>CA_n28A-n78A<br>CA_n40A-n78A                  | n28     | 5, 10, 15, 20                                  | 0                         |
|                      |                                                               | n40     | 5, 10, 15, 20, 25, 30, 40, 50                  |                           |
|                      |                                                               | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100            |                           |
|                      | CA_n28A-n40A<br>CA_n28A-n78A<br>CA_n40A-n78A                  | n28     | 5, 10, 15, 20                                  | 1                         |
|                      |                                                               | n40     | 5, 10, 15, 20, 25, 30, 40, 50, 60, 80, 100     |                           |
|                      |                                                               | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100            |                           |
| CA_n28A-n40B-n78A    | -                                                             | n28     | 5, 10, 15, 20                                  | 0                         |
|                      |                                                               | n40     | CA_n40B_BCS0                                   |                           |
|                      |                                                               | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100            |                           |
| CA_n28A-n40A-n79A    | CA_n28A-n40A<br>CA_n28A-n79A<br>CA_n40A-n79A                  | n28     | 5, 10, 15, 20, 30                              | 0                         |
|                      |                                                               | n40     | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100    |                           |
|                      |                                                               | n79     | 40, 50, 60, 80, 100                            |                           |
| CA_n28A-n41A-n77A    | CA_n28A-n41A<br>CA_n28A-n77A<br>CA_n41A-n77A                  | n28     | 5, 10, 15, 20, 30                              | 0                         |
|                      |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100        |                           |
|                      |                                                               | n77     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100    |                           |
| CA_n28A-n41B-n77A    | CA_n28A-n41A<br>CA_n28A-n77A<br>CA_n41A-n77A                  | n28     | 5, 10                                          | 0                         |
|                      |                                                               | n41     | CA_n41B_BCS0                                   |                           |
|                      |                                                               | n77     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100    |                           |
| CA_n28A-n41A-n77(2A) | CA_n28A-n41A<br>CA_n28A-n77A<br>CA_n41A-n77A                  | n28     | 5, 10, 15, 20, 30                              | 0                         |
|                      |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100        |                           |
|                      |                                                               | n77     | CA_n77(2A)_BCS0                                |                           |
| CA_n28A-n41A-n77(3A) | CA_n28A-n41A<br>CA_n28A-n77A<br>CA_n41A-n77A                  | n28     | 5, 10                                          | 0                         |
|                      |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100        |                           |
|                      |                                                               | n77     | CA_n77(3A)_BCS1                                |                           |
| CA_n28A-n41A-n78A    | CA_n28A-n41A<br>CA_n28A-n78A<br>CA_n41A-n78A                  | n28     | 5, 10, 15, 20                                  | 0                         |
|                      |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 90, 100            |                           |
|                      |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100    |                           |
| CA_n28A-n41A-n78(2A) | CA_n78(2A)                                                    | n28     | 5, 10, 15, 20, 30                              | 0                         |
|                      |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100        |                           |
|                      |                                                               | n78     | CA_n78(2A)_BCS2                                |                           |
| CA_n28A-n41A-n79A    | CA_n28A-n41A<br>CA_n28A-n79A<br>CA_n41A-n79A                  | n28     | 5, 10, 15, 20, 30                              | 0                         |
|                      |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100    |                           |

| NR CA configuration               | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|-----------------------------------|---------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
|                                   |                                                               | n79     | 40, 50, 60, 80, 100                             |                           |
| CA_n28A-n41C-n79A                 | CA_n28A-n41A<br>CA_n28A-n79A<br>CA_n41A-n79A                  | n28     | 5, 10, 15, 20, 30                               | 0                         |
|                                   |                                                               | n41     | CA_n41C_BCS1                                    |                           |
|                                   |                                                               | n79     | 40, 50, 60, 80, 100                             |                           |
|                                   |                                                               |         |                                                 |                           |
| CA_n28A-n46A-n78A                 | CA_n28A-n46A<br>CA_n28A-n78A<br>CA_n46A-n78A                  | n28     | 5, 10, 15, 20                                   | 0                         |
|                                   |                                                               | n46     | 20, 40, 60, 80                                  |                           |
|                                   |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                                   |                                                               |         |                                                 |                           |
| CA_n28A-n46C-n78A                 | CA_n28A-n46A<br>CA_n28A-n78A<br>CA_n46A-n78A                  | n28     | 5, 10, 15, 20                                   | 0                         |
|                                   |                                                               | n46     | CA_n46C_BCS0                                    |                           |
|                                   |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                                   |                                                               |         |                                                 |                           |
| CA_n28A-n46D-n78A                 | CA_n28A-n46A<br>CA_n28A-n78A<br>CA_n46A-n78A                  | n28     | 5, 10, 15, 20                                   | 0                         |
|                                   |                                                               | n46     | CA_n46D_BCS0                                    |                           |
|                                   |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                                   |                                                               |         |                                                 |                           |
| CA_n28A-n77A-n79A <sup>4</sup>    | CA_n28A-n77A<br>CA_n28A-n79A<br>CA_n77A-n79A                  | n28     | 5, 10, 15, 20                                   | 0                         |
|                                   |                                                               | n77     | 10, 15, 20, 40, 50, 60, 80, 90, 100             |                           |
|                                   |                                                               | n79     | 40, 50, 60, 80, 100                             |                           |
|                                   |                                                               |         |                                                 |                           |
| CA_n28A-n77(2A)-n79A <sup>4</sup> | CA_n28A-n77A<br>CA_n28A-n79A<br>CA_n77A-n79A                  | n28     | 5, 10, 15, 20                                   | 0                         |
|                                   |                                                               | n77     | CA_n77(2A)_BCS1                                 |                           |
|                                   |                                                               | n79     | 40, 50, 60, 80, 100                             |                           |
|                                   |                                                               |         |                                                 |                           |
| CA_n28A-n78A-n79A                 | CA_n28A-n78A<br>CA_n28A-n79A<br>CA_n78A-n79A                  | n28     | 5, 10, 15, 20                                   | 0                         |
|                                   |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100     |                           |
|                                   |                                                               | n79     | 40, 50, 60, 80, 100                             |                           |
|                                   |                                                               |         |                                                 |                           |
| CA_n29A-n30A-n66A                 | CA_n30A-n66A                                                  | n29     | 5, 10                                           | 0                         |
|                                   |                                                               | n30     | 5, 10                                           |                           |
|                                   |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                                   |                                                               |         |                                                 |                           |
| CA_n29A-n30A-n66(2A)              | CA_n30A-n66A                                                  | n29     | 5, 10                                           | 0                         |
|                                   |                                                               | n30     | 5, 10                                           |                           |
|                                   |                                                               | n66     | CA_n66(2A)_BCS1                                 |                           |
|                                   |                                                               |         |                                                 |                           |
| CA_n29A-n30A-n77A                 | n77 <sup>7</sup><br>CA_n30A-n77A <sup>7</sup>                 | n29     | 5, 10                                           | 0                         |
|                                   |                                                               | n30     | 5, 10                                           |                           |
|                                   |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                                   |                                                               |         |                                                 |                           |
| CA_n29A-n30A-n77(2A)              | n77 <sup>7</sup><br>CA_n30A-n77A <sup>7</sup>                 | n29     | 5, 10                                           | 0                         |
|                                   |                                                               | n30     | 5, 10                                           |                           |
|                                   |                                                               | n77     | CA_n77(2A)_BCS1                                 |                           |
|                                   |                                                               |         |                                                 |                           |
| CA_n29A-n66A-n70A                 | -                                                             | n29     | 5, 10                                           | 0                         |
|                                   |                                                               | n66     | 5, 10, 15, 20, 40                               |                           |
|                                   |                                                               | n70     | 5, 10, 15, 20 <sup>1</sup> , 25 <sup>1</sup>    |                           |
|                                   |                                                               |         |                                                 |                           |

| NR CA configuration     | Uplink CA configuration or single uplink carrier <sup>6</sup>                              | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|-------------------------|--------------------------------------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
| CA_n29A-n66B-n70A       | -                                                                                          | n29     | 5, 10                                           | 0                         |
|                         |                                                                                            | n66     | CA_n66B_BCS0                                    |                           |
|                         |                                                                                            | n70     | 5, 10, 15, 20 <sup>1</sup> , 25 <sup>1</sup>    |                           |
| CA_n29A-n66(2A)-n70A    | -                                                                                          | n29     | 5, 10                                           | 0                         |
|                         |                                                                                            | n66     | CA_n66(2A)_BCS0                                 |                           |
|                         |                                                                                            | n70     | 5, 10, 15, 20 <sup>1</sup> , 25 <sup>1</sup>    |                           |
| CA_n29A-n66A-n77A       | n77 <sup>7</sup><br>CA_n66A-n77A <sup>7</sup>                                              | n29     | 5, 10                                           | 0                         |
|                         |                                                                                            | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                         |                                                                                            | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n29A-n66(2A)-n77A    | n77 <sup>7</sup><br>CA_n66A-n77A <sup>7</sup>                                              | n29     | 5, 10                                           | 0                         |
|                         |                                                                                            | n66     | CA_n66(2A)_BCS1                                 |                           |
|                         |                                                                                            | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n29A-n66A-n77(2A)    | n77 <sup>7</sup><br>CA_n66A-n77A <sup>7</sup>                                              | n29     | 5, 10                                           | 0                         |
|                         |                                                                                            | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                         |                                                                                            | n77     | CA_n77(2A)_BCS1                                 |                           |
| CA_n30A-n66A-n77A       | n77 <sup>7</sup><br>CA_n30A-n66A<br>CA_n30A-n77A <sup>7</sup><br>CA_n66A-n77A <sup>7</sup> | n30     | 5, 10                                           | 0                         |
|                         |                                                                                            | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                         |                                                                                            | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n30A-n66(2A)-n77A    | n77 <sup>7</sup><br>CA_n30A-n66A<br>CA_n30A-n77A <sup>7</sup><br>CA_n66A-n77A <sup>7</sup> | n30     | 5, 10                                           | 0                         |
|                         |                                                                                            | n66     | CA_n66(2A)_BCS1                                 |                           |
|                         |                                                                                            | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n30A-n66A-n77(2A)    | n77 <sup>7</sup><br>CA_n30A-n66A<br>CA_n30A-n77A <sup>7</sup><br>CA_n66A-n77A <sup>7</sup> | n30     | 5, 10                                           | 0                         |
|                         |                                                                                            | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                         |                                                                                            | n77     | CA_n77(2A)_BCS1                                 |                           |
| CA_n38A-n66A-n78A       | CA_n38A-n66A<br>CA_n38A-n78A<br>CA_n66A-n78A                                               | n38     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                         |                                                                                            | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                         |                                                                                            | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n38A-n66A-n78(2A)    | CA_n38A-n66A<br>CA_n38A-n78A<br>CA_n66A-n78A                                               | n38     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                         |                                                                                            | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                         |                                                                                            | n78     | CA_n78(2A)_BCS2                                 |                           |
| CA_n38A-n66(2A)-n78A    | CA_n38A-n66A<br>CA_n38A-n78A<br>CA_n66A-n78A                                               | n38     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                         |                                                                                            | n66     | CA_n66(2A)_BCS1                                 |                           |
|                         |                                                                                            | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n38A-n66(2A)-n78(2A) | CA_n38A-n66A<br>CA_n38A-n78A<br>CA_n66A-n78A                                               | n38     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                         |                                                                                            | n66     | CA_n66(2A)_BCS1                                 |                           |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)             | Bandwidth combination set |
|---------------------|---------------------------------------------------------------|---------|----------------------------------------------|---------------------------|
|                     |                                                               | n78     | CA_n78(2A)_BCS2                              |                           |
| CA_n39A-n40A-n41A   | CA_n39A-n40A<br>CA_n39A-n41A<br>CA_n40A-n41A                  | n39     | 5, 10, 15, 20, 25, 30, 40                    | 0                         |
|                     |                                                               | n40     | 5, 10, 15, 20, 25, 30, 40, 50, 60, 80        |                           |
|                     |                                                               | n41     | 10, 15, 20, 40, 50, 60, 80, 90, 100          |                           |
| CA_n39A-n40A-n79A   | CA_n39A-n40A<br>CA_n39A-n79A<br>CA_n40A-n79A                  | n39     | 5, 10, 15, 20, 25, 30, 40                    | 0                         |
|                     |                                                               | n40     | 5, 10, 15, 20, 25, 30, 40, 50, 60, 80        |                           |
|                     |                                                               | n79     | 40, 50, 60, 80, 100                          |                           |
| CA_n39A-n41A-n79A   | -                                                             | n39     | 5, 10, 15, 20, 25, 30, 40                    | 0                         |
|                     |                                                               | n41     | 10, 15, 20, 40, 50, 60, 80, 90, 100          |                           |
|                     |                                                               | n79     | 40, 50, 60, 80, 100                          |                           |
|                     |                                                               | n39     | 5, 10, 15, 20, 25, 30, 40                    | 1                         |
|                     |                                                               | n41     | 10, 15, 20, 40, 50, 60                       |                           |
|                     |                                                               | n79     | 40, 50, 60, 80, 100                          |                           |
| CA_n40A-n41A-n79A   | CA_n40A-n41A<br>CA_n40A-n79A<br>CA_n41A-n79A                  | n40     | 5, 10, 15, 20, 25, 30, 40, 50, 60, 80        | 0                         |
|                     |                                                               | n41     | 10, 15, 20, 40, 50, 60, 80, 100              |                           |
|                     |                                                               | n79     | , 40, 50, 60, 80, 100                        |                           |
|                     |                                                               | n40     | 5, 10, 15, 20, 25, 30, 40                    | 1                         |
|                     |                                                               | n41     | 10, 15, 20, 40, 50, 60                       |                           |
|                     |                                                               | n79     | , 40, 50, 60, 80, 100                        |                           |
| CA_n41A-n66A-n70A   | CA_n41A-n66A<br>CA_n41A-n70A                                  | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100  | 0                         |
|                     |                                                               | n66     | 10, 15, 20, 25, 30, 40                       |                           |
|                     |                                                               | n70     | 5, 10, 15, 20 <sup>1</sup> , 25 <sup>1</sup> |                           |
| CA_n41A-n66A-n71A   | -                                                             | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100      | 0                         |
|                     |                                                               | n66     | 5, 10, 15, 20, 40                            |                           |
|                     |                                                               | n71     | 5, 10, 15, 20                                |                           |
|                     | CA_n41A-n71A<br>CA_n41A-n66A<br>CA_n66A-n71A                  | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100  | 1                         |
|                     |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                    |                           |
|                     |                                                               | n71     | 5, 10, 15, 20                                |                           |
|                     | CA_n41A-n71A<br>CA_n41A-n66A<br>CA_n66A-n71A                  | n41     | n41 channel bandwidths in Table 5.3.5-1      | 4 and 5                   |
|                     |                                                               | n66     | n66 channel bandwidths in Table 5.3.5-1      |                           |
|                     |                                                               | n71     | n77 channel bandwidths in Table 5.3.5-1      |                           |
| CA_n41A-n66A-n71B   | CA_n41A-n66A<br>CA_n41A-n71A<br>CA_n66A-n71A                  | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100  | 0                         |
|                     |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                    |                           |
|                     |                                                               | n71     | CA_n71B_BCS2                                 |                           |
|                     | CA_n41A-n66A<br>CA_n41A-n71A<br>CA_n66A-n71A                  | n41     | n41 channel bandwidths in Table 5.3.5-1      | 4 and 5                   |
|                     |                                                               | n66     | n66 channel bandwidths in Table 5.3.5-1      |                           |
|                     |                                                               | n71     | CA_n71B_BCS 4 and 5                          |                           |

| NR CA configuration  | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)            | Bandwidth combination set |
|----------------------|---------------------------------------------------------------|---------|---------------------------------------------|---------------------------|
| CA_n41A-n66A-n71(2A) | CA_n41A-n66A<br>CA_n41A-n71A<br>CA_n66A-n71A                  | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 | 0                         |
|                      |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                   |                           |
|                      |                                                               | n71     | CA_n71(2A)_BCS0                             |                           |
|                      | CA_n41A-n66A<br>CA_n41A-n71A<br>CA_n66A-n71A                  | n41     | n41 channel bandwidths in Table 5.3.5-1     | 4 and 5                   |
|                      |                                                               | n66     | n66 channel bandwidths in Table 5.3.5-1     |                           |
|                      |                                                               | n71     | CA_n71(2A)_BCS 4 and 5                      |                           |
| CA_n41A-n66(2A)-n71A | CA_n41A-n66A<br>CA_n41A-n71A<br>CA_n66A-n71A                  | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 | 0                         |
|                      |                                                               | n66     | CA_n66(2A)_BCS1                             |                           |
|                      |                                                               | n71     | 5, 10, 15, 20                               |                           |
|                      | CA_n41A-n66A<br>CA_n41A-n71A<br>CA_n66A-n71A                  | n41     | n41 channel bandwidths in Table 5.3.5-1     | 4 and 5                   |
|                      |                                                               | n66     | CA_n66(2A)_BCS 4 and 5                      |                           |
|                      |                                                               | n71     | n71 channel bandwidths in Table 5.3.5-1     |                           |
| CA_n41(2A)-n66A-n71A | -                                                             | n41     | CA_n41(2A)_BCS1                             | 0                         |
|                      |                                                               | n66     | 5, 10, 15, 20, 40                           |                           |
|                      |                                                               | n71     | 5, 10, 15, 20                               |                           |
|                      | CA_n41A-n71A<br>CA_n41A-n66A<br>CA_n66A-n71A                  | n41     | CA_n41(2A)_BCS1                             | 1                         |
|                      |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                   |                           |
|                      |                                                               | n71     | 5, 10, 15, 20                               |                           |
|                      | CA_n41A-n71A<br>CA_n41A-n66A<br>CA_n66A-n71A                  | n41     | CA_n41(2A)_BCS 4 and 5                      | 4 and 5                   |
|                      |                                                               | n66     | n66 channel bandwidths in Table 5.3.5-1     |                           |
|                      |                                                               | n71     | n71 channel bandwidths in Table 5.3.5-1     |                           |
| CA_n41C-n66A-n71A    | -                                                             | n41     | CA_n41C_BCS0                                | 0                         |
|                      |                                                               | n66     | 5, 10, 15, 20, 40                           |                           |
|                      |                                                               | n71     | 5, 10, 15, 20                               |                           |
|                      | CA_n41A-n71A<br>CA_n41A-n66A<br>CA_n66A-n71A                  | n41     | CA_n41C_BCS1                                | 1                         |
|                      |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                   |                           |
|                      |                                                               | n71     | 5, 10, 15, 20                               |                           |
|                      | CA_n41A-n71A<br>CA_n41A-n66A<br>CA_n66A-n71A<br>CA_n41C       | n41     | CA_n41C_BCS 4 and 5                         | 4 and 5                   |
|                      |                                                               | n66     | n66 channel bandwidths in Table 5.3.5-1     |                           |
|                      |                                                               | n71     | n71 channel bandwidths in Table 5.3.5-1     |                           |
| CA_n41A-n66A-n77A    | CA_n41A-n66A<br>CA_n41A-n77A<br>CA_n66A-n77A                  | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100     | 0                         |

| NR CA configuration     | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|-------------------------|---------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
|                         |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                         |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                         |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100     | 1                         |
|                         |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                         |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                         | CA_n41A-n66A<br>CA_n41A-n77A<br>CA_n66A-n77A                  | n41     | n41 channel bandwidths in Table 5.3.5-1         | 4 and 5                   |
|                         |                                                               | n66     | n66 channel bandwidths in Table 5.3.5-1         |                           |
|                         |                                                               | n77     | n77 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n41A-n66A-n77(2A)    | CA_n41A-n77A<br>CA_n41A-n66A<br>CA_n66A-n77A                  | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100         | 0                         |
|                         |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                         |                                                               | n77     | CA_n77(2A)_BCS1                                 |                           |
|                         | CA_n41A-n77A<br>CA_n41A-n66A<br>CA_n66A-n77A                  | n41     | n41 channel bandwidths in Table 5.3.5-1         | 4 and 5                   |
|                         |                                                               | n66     | n66 channel bandwidths in Table 5.3.5-1         |                           |
|                         |                                                               | n77     | CA_n77(2A)_BCS 4 and 5                          |                           |
| CA_n41A-n66(2A)-n77A    | CA_n41A-n66A<br>CA_n41A-n77A<br>CA_n66A-n77A                  | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100     | 0                         |
|                         |                                                               | n66     | CA_n66(2A)_BCS1                                 |                           |
|                         |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                         | CA_n41A-n66A<br>CA_n41A-n77A<br>CA_n66A-n77A                  | n41     | n41 channel bandwidths in Table 5.3.5-1         | 4 and 5                   |
|                         |                                                               | n66     | CA_n66(2A)_BCS 4 and 5                          |                           |
|                         |                                                               | n77     | n77 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n41A-n66(2A)-n77(2A) | CA_n41A-n66A<br>CA_n41A-n77A<br>CA_n66A-n77A                  | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100     | 0                         |
|                         |                                                               | n66     | CA_n66(2A)_BCS1                                 |                           |
|                         |                                                               | n77     | CA_n77(2A)_BCS1                                 |                           |
|                         | CA_n41A-n66A<br>CA_n41A-n77A<br>CA_n66A-n77A                  | n41     | n41 channel bandwidths in Table 5.3.5-1         | 4 and 5                   |
|                         |                                                               | n66     | CA_n66(2A)_BCS 4 and 5                          |                           |
|                         |                                                               | n77     | CA_n77(2A)_BCS 4 and 5                          |                           |
| CA_n41(2A)-n66A-n77A    | CA_n41A-n66A<br>CA_n41A-n77A<br>CA_n66A-n77A                  | n41     | CA_n41(2A)_BCS1                                 | 0                         |
|                         |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                         |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                         | CA_n41A-n66A<br>CA_n41A-n77A<br>CA_n66A-n77A                  | n41     | CA_n41(2A)_BCS 4 and 5                          | 4 and 5                   |
|                         |                                                               | n66     | n66 channel bandwidths in Table 5.3.5-1         |                           |
|                         |                                                               | n77     | n77 channel bandwidths in Table 5.3.5-1         |                           |

| NR CA configuration     | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|-------------------------|---------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
| CA_n41C-n66A-n77A       | CA_n41A-n66A<br>CA_n41A-n77A<br>CA_n41C<br>CA_n66A-n77A       | n41     | CA_n41(2A)_BCS 4 and 5                          | 4 and 5                   |
|                         |                                                               | n66     | n66 channel bandwidths in Table 5.3.5-1         |                           |
|                         |                                                               | n77     | CA_n77(2A)_BCS 4 and 5                          |                           |
|                         | CA_n41A-n66A<br>CA_n41A-n77A<br>CA_n41C<br>CA_n66A-n77A       | n41     | CA_n41C_BCS0                                    | 0                         |
|                         |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                         |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n41C-n66A-n77(2A)    | CA_n41A-n66A<br>CA_n41A-n77A<br>CA_n41C<br>CA_n66A-n77A       | n41     | CA_n41C_BCS 4 and 5                             | 4 and 5                   |
|                         |                                                               | n66     | n66 channel bandwidths in Table 5.3.5-1         |                           |
|                         |                                                               | n77     | n77 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n41C-n66A-n77(2A)    | CA_n41C<br>CA_n41A-n66A<br>CA_n41A-n77A<br>CA_n66A-n77A       | n41     | CA_n41C_BCS 4 and 5                             | 4 and 5                   |
|                         |                                                               | n66     | n66 channel bandwidths in Table 5.3.5-1         |                           |
|                         |                                                               | n77     | CA_n77(2A)_BCS 4 and 5                          |                           |
| CA_n41A-n66A-n78A       | CA_n41A-n66A<br>CA_n41A-n78A<br>CA_n66A-n78A                  | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100     | 0                         |
|                         |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                         |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n41A-n66A-n78(2A)    | CA_n41A-n66A<br>CA_n41A-n78A<br>CA_n66A-n78A                  | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100     | 0                         |
|                         |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                         |                                                               | n78     | CA_n78(2A)_BCS2                                 |                           |
| CA_n41A-n66(2A)-n78A    | CA_n41A-n66A<br>CA_n41A-n78A<br>CA_n66A-n78A                  | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100     | 0                         |
|                         |                                                               | n66     | CA_n66(2A)_BCS1                                 |                           |
|                         |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n41A-n66(2A)-n78(2A) | CA_n41A-n66A<br>CA_n41A-n78A<br>CA_n66A-n78A                  | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100     | 0                         |
|                         |                                                               | n66     | CA_n66(2A)_BCS1                                 |                           |
|                         |                                                               | n78     | CA_n78(2A)_BCS2                                 |                           |
| CA_n41A-n70A-n78A       | CA_n41A-n70A<br>CA_n41A-n78A<br>CA_n70A-n78A                  | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100     | 0                         |
|                         |                                                               | n70     | 5, 10, 15, 20, 25                               |                           |
|                         |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n41A-n71A-n77A       | CA_n41A-n71A<br>CA_n41A-n77A<br>CA_n71A-n77A                  | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100         | 0                         |
|                         |                                                               | n71     | 5, 10, 15, 20                                   |                           |
|                         |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |



| NR CA configuration     | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|-------------------------|---------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
|                         |                                                               | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100     | 1                         |
|                         |                                                               | n71     | 5, 10, 15, 20                                   |                           |
|                         |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                         |                                                               | n41     | n41 channel bandwidths in Table 5.3.5-1         | 4 and 5                   |
|                         |                                                               | n71     | n71 channel bandwidths in Table 5.3.5-1         |                           |
|                         |                                                               | n77     | n77 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n41A-n71B-n77A       | CA_n41A-n71A<br>CA_n41A-n77A<br>CA_n71A-n77A                  | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100     | 0                         |
|                         |                                                               | n71     | CA_n71B_BCS2                                    |                           |
|                         |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                         | CA_n41A-n71A<br>CA_n41A-n77A<br>CA_n71A-n77A                  | n41     | n41 channel bandwidths in Table 5.3.5-1         | 4 and 5                   |
|                         |                                                               | n71     | CA_n71B_BCS 4 and 5                             |                           |
|                         |                                                               | n77     | n77 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n41A-n71(2A)-n77A    | CA_n41A-n71A<br>CA_n41A-n77A<br>CA_n71A-n77A                  | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100     | 0                         |
|                         |                                                               | n71     | CA_n71(2A)_BCS0                                 |                           |
|                         |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                         | CA_n41A-n71A<br>CA_n41A-n77A<br>CA_n71A-n77A                  | n41     | n41 channel bandwidths in Table 5.3.5-1         | 4 and 5                   |
|                         |                                                               | n71     | CA_n71(2A)_BCS 4 and 5                          |                           |
|                         |                                                               | n77     | n77 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n41A-n71A-n77(2A)    | CA_n41A-n71A<br>CA_n41A-n77A<br>CA_n71A-n77A                  | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100     | 0                         |
|                         |                                                               | n71     | 5, 10, 15, 20                                   |                           |
|                         |                                                               | n77     | CA_n77(2A)_BCS1                                 |                           |
|                         | CA_n41A-n71A<br>CA_n41A-n77A<br>CA_n71A-n77A                  | n41     | n41 channel bandwidths in Table 5.3.5-1         | 4 and 5                   |
|                         |                                                               | n71     | n71 channel bandwidths in Table 5.3.5-1         |                           |
|                         |                                                               | n77     | CA_n77(2A)_BCS 4 and 5                          |                           |
| CA_n41(2A)-n71A-n77A    | CA_n41A-n71A<br>CA_n41A-n77A<br>CA_n71A-n77A                  | n41     | CA_n41(2A)_BCS1                                 | 0                         |
|                         |                                                               | n71     | 5, 10, 15, 20                                   |                           |
|                         |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                         | CA_n41A-n71A<br>CA_n41A-n77A<br>CA_n71A-n77A                  | n41     | CA_n41(2A)_BCS 4 and 5                          | 4 and 5                   |
|                         |                                                               | n71     | n71 channel bandwidths in Table 5.3.5-1         |                           |
|                         |                                                               | n77     | n77 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n41(2A)-n71A-n77(2A) |                                                               | n41     | CA_n41(2A)_BCS 4 and 5                          | 4 and 5                   |
|                         |                                                               | n71     | n71 channel bandwidths in Table 5.3.5-1         |                           |

| NR CA configuration  | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                                                                                                        | Bandwidth combination set |
|----------------------|---------------------------------------------------------------|---------|-----------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
|                      |                                                               | n77     | CA_n77(2A)_BCS 4 and 5                                                                                                                  |                           |
| CA_n41C-n71A-n77A    | CA_n41A-n71A<br>CA_n41A-n77A<br>CA_n41C<br>CA_n71A-n77A       | n41     | CA_n41C_BCS0                                                                                                                            | 0                         |
|                      |                                                               | n71     | 5, 10, 15, 20                                                                                                                           |                           |
|                      |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                         |                           |
|                      | CA_n41A-n71A<br>CA_n41A-n77A<br>CA_n41C<br>CA_n71A-n77A       | n41     | CA_n41C_BCS 4 and 5                                                                                                                     | 4 and 5                   |
|                      |                                                               | n71     | n71 channel bandwidths in Table 5.3.5-1                                                                                                 |                           |
|                      |                                                               | n77     | n77 channel bandwidths in Table 5.3.5-1                                                                                                 |                           |
| CA_n41C-n71A-n77(2A) | CA_n41A-n71A<br>CA_n41A-n77A<br>CA_n41C<br>CA_n71A-n77A       | n41     | CA_n41C_BCS 4 and 5                                                                                                                     | 4 and 5                   |
|                      |                                                               | n71     | n71 channel bandwidths in Table 5.3.5-1                                                                                                 |                           |
|                      |                                                               | n77     | CA_n77(2A)_BCS 4 and 5                                                                                                                  |                           |
| CA_n41A-n71A-n78A    | CA_n41A-n71A<br>CA_n41A-n78A<br>CA_n71A-n78A                  | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100                                                                                             | 0                         |
|                      |                                                               | n71     | 5, 10, 15, 20                                                                                                                           |                           |
|                      |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                         |                           |
| CA_n41A-n71A-n78(2A) | CA_n41A-n71A<br>CA_n41A-n78A<br>CA_n71A-n78A                  | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100                                                                                             | 0                         |
|                      |                                                               | n71     | 5, 10, 15, 20                                                                                                                           |                           |
|                      |                                                               | n78     | CA_n78(2A)_BCS2                                                                                                                         |                           |
| CA_n46A-n48A-n96A    | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | 10, 20, 40, 60, 80                                                                                                                      | 0                         |
|                      |                                                               | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> |                           |
|                      |                                                               | n96     | 20, 40, 60, 80                                                                                                                          |                           |
| CA_n46B-n48A-n96A    | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46B_BCS0                                                                                                                            | 0                         |
|                      |                                                               | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> |                           |
|                      |                                                               | n96     | 20, 40, 60, 80                                                                                                                          |                           |
| CA_n46C-n48A-n96A    | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46C_BCS0                                                                                                                            | 0                         |
|                      |                                                               | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> |                           |
|                      |                                                               | n96     | 20, 40, 60, 80                                                                                                                          |                           |
| CA_n46D-n48A-n96A    | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46D_BCS0                                                                                                                            | 0                         |
|                      |                                                               | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> |                           |
|                      |                                                               | n96     | 20, 40, 60, 80                                                                                                                          |                           |
| CA_n46M-n48A-n96A    | -                                                             | n46     | CA_n46M_BCS0                                                                                                                            | 0                         |
|                      |                                                               | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> |                           |
|                      |                                                               | n96     | 20, 40, 60, 80                                                                                                                          |                           |
| CA_n46N-n48A-n96A    | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46N_BCS1                                                                                                                            | 0                         |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>6</sup>           | NR Band | Channel bandwidth (MHz) (NOTE 3)                                                                                                        | Bandwidth combination set |
|---------------------|-------------------------------------------------------------------------|---------|-----------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
|                     |                                                                         | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> |                           |
|                     |                                                                         | n96     | 20, 40, 60, 80                                                                                                                          |                           |
| CA_n46A-n48B-n96A   | CA_n46A-n48A<br>CA_n46A-n48B<br>CA_n48A-n96A<br>CA_n48B<br>CA_n48B-n96A | n46     | 10, 20, 40, 60, 80                                                                                                                      | 0                         |
|                     |                                                                         | n48     | CA_n48B_BCS0                                                                                                                            |                           |
|                     |                                                                         | n96     | 20, 40, 60, 80                                                                                                                          |                           |
| CA_n46B-n48B-n96A   | CA_n46A-n48A<br>CA_n46A-n48B<br>CA_n48A-n96A<br>CA_n48B<br>CA_n48B-n96A | n46     | CA_n46B_BCS0                                                                                                                            | 0                         |
|                     |                                                                         | n48     | CA_n48B_BCS0                                                                                                                            |                           |
|                     |                                                                         | n96     | 20, 40, 60, 80                                                                                                                          |                           |
| CA_n46C-n48B-n96A   | CA_n46A-n48A<br>CA_n46A-n48B<br>CA_n48A-n96A<br>CA_n48B<br>CA_n48B-n96A | n46     | CA_n46C_BCS0                                                                                                                            | 0                         |
|                     |                                                                         | n48     | CA_n48B_BCS0                                                                                                                            |                           |
|                     |                                                                         | n96     | 20, 40, 60, 80                                                                                                                          |                           |
| CA_n46D-n48B-n96A   | CA_n46A-n48A<br>CA_n46A-n48B<br>CA_n48A-n96A<br>CA_n48B<br>CA_n48B-n96A | n46     | CA_n46D_BCS0                                                                                                                            | 0                         |
|                     |                                                                         | n48     | CA_n48B_BCS0                                                                                                                            |                           |
|                     |                                                                         | n96     | 20, 40, 60, 80                                                                                                                          |                           |
| CA_n46M-n48B-n96A   | CA_n46A-n48A<br>CA_n46A-n48B<br>CA_n48A-n96A<br>CA_n48B<br>CA_n48B-n96A | n46     | CA_n46M_BCS0                                                                                                                            | 0                         |
|                     |                                                                         | n48     | CA_n48B_BCS0                                                                                                                            |                           |
|                     |                                                                         | n96     | 20, 40, 60, 80                                                                                                                          |                           |
| CA_n46N-n48B-n96A   | CA_n46A-n48A<br>CA_n46A-n48B<br>CA_n48A-n96A<br>CA_n48B<br>CA_n48B-n96A | n46     | CA_n46N_BCS1                                                                                                                            | 0                         |
|                     |                                                                         | n48     | CA_n48B_BCS0                                                                                                                            |                           |
|                     |                                                                         | n96     | 20, 40, 60, 80                                                                                                                          |                           |
| CA_n46A-n48C-n96A   | CA_n46A-n48A<br>CA_n46A-n48B<br>CA_n48A-n96A<br>CA_n48B<br>CA_n48B-n96A | n46     | 10, 20, 40, 60, 80                                                                                                                      | 0                         |
|                     |                                                                         | n48     | CA_n48C_BCS0                                                                                                                            |                           |
|                     |                                                                         | n96     | 20, 40, 60, 80                                                                                                                          |                           |
| CA_n46B-n48C-n96A   | CA_n46A-n48A<br>CA_n46A-n48B<br>CA_n48A-n96A<br>CA_n48B<br>CA_n48B-n96A | n46     | CA_n46B_BCS0                                                                                                                            | 0                         |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>6</sup>           | NR Band | Channel bandwidth (MHz) (NOTE 3)                                                                                                        | Bandwidth combination set |
|---------------------|-------------------------------------------------------------------------|---------|-----------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
|                     |                                                                         | n48     | CA_n48C_BCS0                                                                                                                            |                           |
|                     |                                                                         | n96     | 20, 40, 60, 80                                                                                                                          |                           |
|                     |                                                                         |         |                                                                                                                                         |                           |
| CA_n46C-n48C-n96A   | CA_n46A-n48A<br>CA_n46A-n48B<br>CA_n48A-n96A<br>CA_n48B<br>CA_n48B-n96A | n46     | CA_n46C_BCS0                                                                                                                            | 0                         |
|                     |                                                                         | n48     | CA_n48C_BCS0                                                                                                                            |                           |
|                     |                                                                         | n96     | 20, 40, 60, 80                                                                                                                          |                           |
| CA_n46D-n48C-n96A   | CA_n46A-n48A<br>CA_n46A-n48B<br>CA_n48A-n96A<br>CA_n48B<br>CA_n48B-n96A | n46     | CA_n46D_BCS0                                                                                                                            | 0                         |
|                     |                                                                         | n48     | CA_n48C_BCS0                                                                                                                            |                           |
|                     |                                                                         | n96     | 20, 40, 60, 80                                                                                                                          |                           |
| CA_n46M-n48C-n96A   | -                                                                       | n46     | CA_n46M_BCS0                                                                                                                            | 0                         |
|                     |                                                                         | n48     | CA_n48C_BCS0                                                                                                                            |                           |
|                     |                                                                         | n96     | 20, 40, 60, 80                                                                                                                          |                           |
| CA_n46N-n48C-n96A   | CA_n46A-n48A<br>CA_n46A-n48B<br>CA_n48A-n96A<br>CA_n48B<br>CA_n48B-n96A | n46     | CA_n46N_BCS1                                                                                                                            | 0                         |
|                     |                                                                         | n48     | CA_n48C_BCS0                                                                                                                            |                           |
|                     |                                                                         | n96     | 20, 40, 60, 80                                                                                                                          |                           |
| CA_n46A-n48A-n96B   | CA_n46A-n48A<br>CA_n48A-n96A                                            | n46     | 10, 20, 40, 60, 80                                                                                                                      | 0                         |
|                     |                                                                         | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> |                           |
|                     |                                                                         | n96     | CA_n96B_BCS0                                                                                                                            |                           |
| CA_n46B-n48A-n96B   | CA_n46A-n48A<br>CA_n48A-n96A                                            | n46     | CA_n46B_BCS0                                                                                                                            | 0                         |
|                     |                                                                         | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> |                           |
|                     |                                                                         | n96     | CA_n96B_BCS0                                                                                                                            |                           |
| CA_n46C-n48A-n96B   | CA_n46A-n48A<br>CA_n48A-n96A                                            | n46     | CA_n46C_BCS0                                                                                                                            | 0                         |
|                     |                                                                         | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> |                           |
|                     |                                                                         | n96     | CA_n96B_BCS0                                                                                                                            |                           |
| CA_n46D-n48A-n96B   | CA_n46A-n48A<br>CA_n48A-n96A                                            | n46     | CA_n46D_BCS0                                                                                                                            | 0                         |
|                     |                                                                         | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> |                           |
|                     |                                                                         | n96     | CA_n96B_BCS0                                                                                                                            |                           |
| CA_n46M-n48A-n96B   | -                                                                       | n46     | CA_n46M_BCS0                                                                                                                            | 0                         |
|                     |                                                                         | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> |                           |
|                     |                                                                         | n96     | CA_n96B_BCS0                                                                                                                            |                           |
| CA_n46N-n48A-n96B   | CA_n46A-n48A<br>CA_n48A-n96A                                            | n46     | CA_n46N_BCS1                                                                                                                            | 0                         |
|                     |                                                                         | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> |                           |
|                     |                                                                         | n96     | CA_n96B_BCS0                                                                                                                            |                           |
| CA_n46A-n48A-n96C   | -                                                                       | n46     | 10, 20, 40, 60, 80                                                                                                                      | 0                         |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>6</sup>           | NR Band | Channel bandwidth (MHz) (NOTE 3)                                                                                                        | Bandwidth combination set |
|---------------------|-------------------------------------------------------------------------|---------|-----------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| CA_n46B-n48A-n96C   | -                                                                       | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> | 0                         |
|                     |                                                                         | n96     | CA_n96C_BCS0                                                                                                                            |                           |
|                     |                                                                         | n46     | CA_n46B_BCS0                                                                                                                            |                           |
| CA_n46C-n48A-n96C   | -                                                                       | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> | 0                         |
|                     |                                                                         | n96     | CA_n96C_BCS0                                                                                                                            |                           |
|                     |                                                                         | n46     | CA_n46C_BCS0                                                                                                                            |                           |
| CA_n46D-n48A-n96C   | -                                                                       | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> | 0                         |
|                     |                                                                         | n96     | CA_n96C_BCS0                                                                                                                            |                           |
|                     |                                                                         | n46     | CA_n46D_BCS0                                                                                                                            |                           |
| CA_n46M-n48A-n96C   | -                                                                       | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> | 0                         |
|                     |                                                                         | n96     | CA_n96C_BCS0                                                                                                                            |                           |
|                     |                                                                         | n46     | CA_n46M_BCS0                                                                                                                            |                           |
| CA_n46N-n48A-n96C   | -                                                                       | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> | 0                         |
|                     |                                                                         | n96     | CA_n96C_BCS0                                                                                                                            |                           |
|                     |                                                                         | n46     | CA_n46N_BCS1                                                                                                                            |                           |
| CA_n46A-n48B-n96C   | CA_n46A-n48A<br>CA_n46A-n48B<br>CA_n48A-n96A<br>CA_n48B<br>CA_n48B-n96A | n48     | CA_n48B_BCS0                                                                                                                            | 0                         |
|                     |                                                                         | n96     | CA_n96C_BCS0                                                                                                                            |                           |
|                     |                                                                         | n46     | 10, 20, 40, 60, 80                                                                                                                      |                           |
| CA_n46B-n48B-n96C   | CA_n46A-n48A<br>CA_n46A-n48B<br>CA_n48A-n96A<br>CA_n48B<br>CA_n48B-n96A | n48     | CA_n48B_BCS0                                                                                                                            | 0                         |
|                     |                                                                         | n96     | CA_n96C_BCS0                                                                                                                            |                           |
|                     |                                                                         | n46     | CA_n46B_BCS0                                                                                                                            |                           |
| CA_n46C-n48B-n96C   | CA_n46A-n48A<br>CA_n46A-n48B<br>CA_n48A-n96A<br>CA_n48B<br>CA_n48B-n96A | n48     | CA_n48B_BCS0                                                                                                                            | 0                         |
|                     |                                                                         | n96     | CA_n96C_BCS0                                                                                                                            |                           |
|                     |                                                                         | n46     | CA_n46C_BCS0                                                                                                                            |                           |
| CA_n46D-n48B-n96C   | CA_n46A-n48A<br>CA_n46A-n48B<br>CA_n48A-n96A<br>CA_n48B<br>CA_n48B-n96A | n48     | CA_n48B_BCS0                                                                                                                            | 0                         |
|                     |                                                                         | n96     | CA_n96C_BCS0                                                                                                                            |                           |
|                     |                                                                         | n46     | CA_n46D_BCS0                                                                                                                            |                           |
| CA_n46M-n48B-n96C   | -                                                                       | n48     | CA_n48B_BCS0                                                                                                                            | 0                         |
|                     |                                                                         | n46     | CA_n46M_BCS0                                                                                                                            |                           |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>6</sup>           | NR Band | Channel bandwidth (MHz) (NOTE 3)                                                                                                        | Bandwidth combination set |
|---------------------|-------------------------------------------------------------------------|---------|-----------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
|                     |                                                                         | n96     | CA_n96C_BCS0                                                                                                                            |                           |
| CA_n46N-n48B-n96C   | CA_n46A-n48A<br>CA_n46A-n48B<br>CA_n48A-n96A<br>CA_n48B<br>CA_n48B-n96A | n46     | CA_n46N_BCS1                                                                                                                            | 0                         |
|                     |                                                                         | n48     | CA_n48B_BCS0                                                                                                                            |                           |
|                     |                                                                         | n96     | CA_n96C_BCS0                                                                                                                            |                           |
| CA_n46A-n48C-n96C   | -                                                                       | n46     | 10, 20, 40, 60, 80                                                                                                                      | 0                         |
|                     |                                                                         | n48     | CA_n48C_BCS0                                                                                                                            |                           |
|                     |                                                                         | n96     | CA_n96C_BCS0                                                                                                                            |                           |
| CA_n46B-n48C-n96C   | -                                                                       | n46     | CA_n46B_BCS0                                                                                                                            | 0                         |
|                     |                                                                         | n48     | CA_n48C_BCS0                                                                                                                            |                           |
|                     |                                                                         | n96     | CA_n96C_BCS0                                                                                                                            |                           |
| CA_n46C-n48C-n96C   | -                                                                       | n46     | CA_n46C_BCS0                                                                                                                            | 0                         |
|                     |                                                                         | n48     | CA_n48C_BCS0                                                                                                                            |                           |
|                     |                                                                         | n96     | CA_n96C_BCS0                                                                                                                            |                           |
| CA_n46D-n48C-n96C   | -                                                                       | n46     | CA_n46D_BCS0                                                                                                                            | 0                         |
|                     |                                                                         | n48     | CA_n48C_BCS0                                                                                                                            |                           |
|                     |                                                                         | n96     | CA_n96C_BCS0                                                                                                                            |                           |
| CA_n46M-n48C-n96C   | -                                                                       | n46     | CA_n46M_BCS0                                                                                                                            | 0                         |
|                     |                                                                         | n48     | CA_n48C_BCS0                                                                                                                            |                           |
|                     |                                                                         | n96     | CA_n96C_BCS0                                                                                                                            |                           |
| CA_n46N-n48C-n96C   | -                                                                       | n46     | CA_n46N_BCS1                                                                                                                            | 0                         |
|                     |                                                                         | n48     | CA_n48C_BCS0                                                                                                                            |                           |
|                     |                                                                         | n96     | CA_n96C_BCS0                                                                                                                            |                           |
| CA_n46A-n48A-n96D   | -                                                                       | n46     | 10, 20, 40, 60, 80                                                                                                                      | 0                         |
|                     |                                                                         | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> |                           |
|                     |                                                                         | n96     | CA_n96D_BCS0                                                                                                                            |                           |
| CA_n46B-n48A-n96D   | -                                                                       | n46     | CA_n46B_BCS0                                                                                                                            | 0                         |
|                     |                                                                         | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> |                           |
|                     |                                                                         | n96     | CA_n96D_BCS0                                                                                                                            |                           |
| CA_n46C-n48A-n96D   | -                                                                       | n46     | CA_n46C_BCS0                                                                                                                            | 0                         |
|                     |                                                                         | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> |                           |
|                     |                                                                         | n96     | CA_n96D_BCS0                                                                                                                            |                           |
| CA_n46D-n48A-n96D   | -                                                                       | n46     | CA_n46D_BCS0                                                                                                                            | 0                         |
|                     |                                                                         | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> |                           |
|                     |                                                                         | n96     | CA_n96D_BCS0                                                                                                                            |                           |
| CA_n46M-n48A-n96D   | -                                                                       | n46     | CA_n46M_BCS0                                                                                                                            | 0                         |
|                     |                                                                         | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> |                           |
|                     |                                                                         | n96     | CA_n96D_BCS0                                                                                                                            |                           |
| CA_n46N-n48A-n96D   | -                                                                       | n46     | CA_n46N_BCS1                                                                                                                            | 0                         |
|                     |                                                                         | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> |                           |
|                     |                                                                         | n96     | CA_n96D_BCS0                                                                                                                            |                           |

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>6</sup>           | NR Band | Channel bandwidth (MHz) (NOTE 3)                                                                                                        | Bandwidth combination set |
|---------------------|-------------------------------------------------------------------------|---------|-----------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| CA_n46A-n48C-n96D   | CA_n46A-n48A<br>CA_n46A-n48B<br>CA_n48A-n96A<br>CA_n48B<br>CA_n48B-n96A | n46     | 10, 20, 40, 60, 80                                                                                                                      | 0                         |
|                     |                                                                         | n48     | CA_n48C_BCS0                                                                                                                            |                           |
|                     |                                                                         | n96     | CA_n96D_BCS0                                                                                                                            |                           |
| CA_n46B-n48C-n96D   | CA_n46A-n48A<br>CA_n46A-n48B<br>CA_n48A-n96A<br>CA_n48B<br>CA_n48B-n96A | n46     | CA_n46B_BCS0                                                                                                                            | 0                         |
|                     |                                                                         | n48     | CA_n48C_BCS0                                                                                                                            |                           |
|                     |                                                                         | n96     | CA_n96D_BCS0                                                                                                                            |                           |
| CA_n46C-n48C-n96D   | CA_n46A-n48A<br>CA_n46A-n48B<br>CA_n48A-n96A<br>CA_n48B<br>CA_n48B-n96A | n46     | CA_n46C_BCS0                                                                                                                            | 0                         |
|                     |                                                                         | n48     | CA_n48C_BCS0                                                                                                                            |                           |
|                     |                                                                         | n96     | CA_n96D_BCS0                                                                                                                            |                           |
| CA_n46D-n48C-n96D   | CA_n46A-n48A<br>CA_n46A-n48B<br>CA_n48A-n96A<br>CA_n48B<br>CA_n48B-n96A | n46     | CA_n46D_BCS0                                                                                                                            | 0                         |
|                     |                                                                         | n48     | CA_n48C_BCS0                                                                                                                            |                           |
|                     |                                                                         | n96     | CA_n96D_BCS0                                                                                                                            |                           |
| CA_n46M-n48C-n96D   | -                                                                       | n46     | CA_n46M_BCS0                                                                                                                            | 0                         |
|                     |                                                                         | n48     | CA_n48C_BCS0                                                                                                                            |                           |
|                     |                                                                         | n96     | CA_n96D_BCS0                                                                                                                            |                           |
| CA_n46N-n48C-n96D   | CA_n46A-n48A<br>CA_n46A-n48B<br>CA_n48A-n96A<br>CA_n48B<br>CA_n48B-n96A | n46     | CA_n46N_BCS1                                                                                                                            | 0                         |
|                     |                                                                         | n48     | CA_n48C_BCS0                                                                                                                            |                           |
|                     |                                                                         | n96     | CA_n96D_BCS0                                                                                                                            |                           |
| CA_n46A-n48A-n96E   | -                                                                       | n46     | 10, 20, 40, 60, 80                                                                                                                      | 0                         |
|                     |                                                                         | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> |                           |
|                     |                                                                         | n96     | CA_n96E_BCS0                                                                                                                            |                           |
| CA_n46B-n48A-n96E   | -                                                                       | n46     | CA_n46B_BCS0                                                                                                                            | 0                         |
|                     |                                                                         | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> |                           |
|                     |                                                                         | n96     | CA_n96E_BCS0                                                                                                                            |                           |
| CA_n46C-n48A-n96E   | -                                                                       | n46     | CA_n46C_BCS0                                                                                                                            | 0                         |
|                     |                                                                         | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> |                           |
|                     |                                                                         | n96     | CA_n96E_BCS0                                                                                                                            |                           |
| CA_n46D-n48A-n96E   | -                                                                       | n46     | CA_n46D_BCS0                                                                                                                            | 0                         |
|                     |                                                                         | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> |                           |

| NR CA configuration  | Uplink CA configuration or single uplink carrier <sup>6</sup>           | NR Band | Channel bandwidth (MHz) (NOTE 3)                                                                                                        | Bandwidth combination set |
|----------------------|-------------------------------------------------------------------------|---------|-----------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
|                      |                                                                         | n96     | CA_n96E_BCS0                                                                                                                            |                           |
| CA_n46M-n48A-n96E    | -                                                                       | n46     | CA_n46M_BCS0                                                                                                                            | 0                         |
|                      |                                                                         | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> |                           |
|                      |                                                                         | n96     | CA_n96E_BCS0                                                                                                                            |                           |
| CA_n46N-n48A-n96E    | -                                                                       | n46     | CA_n46N_BCS1                                                                                                                            | 0                         |
|                      |                                                                         | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> |                           |
|                      |                                                                         | n96     | CA_n96E_BCS0                                                                                                                            |                           |
| CA_n46A-n48C-n96E    | CA_n46A-n48A<br>CA_n46A-n48B<br>CA_n48A-n96A<br>CA_n48B<br>CA_n48B-n96A | n46     | 10, 20, 40, 60, 80                                                                                                                      | 0                         |
|                      |                                                                         | n48     | CA_n48C_BCS0                                                                                                                            |                           |
|                      |                                                                         | n96     | CA_n96E_BCS0                                                                                                                            |                           |
| CA_n46B-n48C-n96E    | CA_n46A-n48A<br>CA_n46A-n48B<br>CA_n48A-n96A<br>CA_n48B<br>CA_n48B-n96A | n46     | CA_n46B_BCS0                                                                                                                            | 0                         |
|                      |                                                                         | n48     | CA_n48C_BCS0                                                                                                                            |                           |
|                      |                                                                         | n96     | CA_n96E_BCS0                                                                                                                            |                           |
| CA_n46C-n48C-n96E    | CA_n46A-n48A<br>CA_n46A-n48B<br>CA_n48A-n96A<br>CA_n48B<br>CA_n48B-n96A | n46     | CA_n46C_BCS0                                                                                                                            | 0                         |
|                      |                                                                         | n48     | CA_n48C_BCS0                                                                                                                            |                           |
|                      |                                                                         | n96     | CA_n96E_BCS0                                                                                                                            |                           |
| CA_n46D-n48C-n96E    | CA_n46A-n48A<br>CA_n46A-n48B<br>CA_n48A-n96A<br>CA_n48B<br>CA_n48B-n96A | n46     | CA_n46D_BCS0                                                                                                                            | 0                         |
|                      |                                                                         | n48     | CA_n48C_BCS0                                                                                                                            |                           |
|                      |                                                                         | n96     | CA_n96E_BCS0                                                                                                                            |                           |
| CA_n46M-n48C-n96E    | -                                                                       | n46     | CA_n46M_BCS0                                                                                                                            | 0                         |
|                      |                                                                         | n48     | CA_n48C_BCS0                                                                                                                            |                           |
|                      |                                                                         | n96     | CA_n96E_BCS0                                                                                                                            |                           |
| CA_n46N-n48C-n96E    | CA_n46A-n48A<br>CA_n46A-n48B<br>CA_n48A-n96A<br>CA_n48B<br>CA_n48B-n96A | n46     | CA_n46N_BCS1                                                                                                                            | 0                         |
|                      |                                                                         | n48     | CA_n48C_BCS0                                                                                                                            |                           |
|                      |                                                                         | n96     | CA_n96E_BCS0                                                                                                                            |                           |
| CA_n46A-n48(2A)-n96A | CA_n46A-n48A<br>CA_n48A-n96A                                            | n46     | 10, 20, 40, 60, 80                                                                                                                      | 0                         |
|                      |                                                                         | n48     | CA_n48(2A)_BCS0                                                                                                                         |                           |
|                      |                                                                         | n96     | 20, 40, 60, 80                                                                                                                          |                           |
| CA_n46B-n48(2A)-n96A | CA_n46A-n48A<br>CA_n48A-n96A                                            | n46     | CA_n46B_BCS0                                                                                                                            | 0                         |
|                      |                                                                         | n48     | CA_n48(2A)_BCS0                                                                                                                         |                           |
|                      |                                                                         | n96     | 20, 40, 60, 80                                                                                                                          |                           |



| NR CA configuration  | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3) | Bandwidth combination set |
|----------------------|---------------------------------------------------------------|---------|----------------------------------|---------------------------|
| CA_n46C-n48(2A)-n96A | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46C_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(2A)_BCS0                  |                           |
|                      |                                                               | n96     | 20, 40, 60, 80                   |                           |
| CA_n46D-n48(2A)-n96A | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46D_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(2A)_BCS0                  |                           |
|                      |                                                               | n96     | 20, 40, 60, 80                   |                           |
| CA_n46M-n48(2A)-n96A | -                                                             | n46     | CA_n46M_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(2A)_BCS0                  |                           |
|                      |                                                               | n96     | 20, 40, 60, 80                   |                           |
| CA_n46N-n48(2A)-n96A | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46N_BCS1                     | 0                         |
|                      |                                                               | n48     | CA_n48(2A)_BCS0                  |                           |
|                      |                                                               | n96     | 20, 40, 60, 80                   |                           |
| CA_n46A-n48(2A)-n96B | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | 20, 40, 60, 80                   | 0                         |
|                      |                                                               | n48     | CA_n48(2A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96B_BCS0                     |                           |
| CA_n46B-n48(2A)-n96B | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46B_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(2A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96B_BCS0                     |                           |
| CA_n46C-n48(2A)-n96B | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46C_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(2A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96B_BCS0                     |                           |
| CA_n46D-n48(2A)-n96B | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46D_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(2A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96B_BCS0                     |                           |
| CA_n46M-n48(2A)-n96B | -                                                             | n46     | CA_n46M_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(2A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96B_BCS0                     |                           |
| CA_n46N-n48(2A)-n96B | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46N_BCS1                     | 0                         |
|                      |                                                               | n48     | CA_n48(2A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96B_BCS0                     |                           |
| CA_n46A-n48(2A)-n96C | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | 10, 20, 40, 60, 80               | 0                         |
|                      |                                                               | n48     | CA_n48(2A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96C_BCS0                     |                           |
| CA_n46B-n48(2A)-n96C | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46B_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(2A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96C_BCS0                     |                           |
| CA_n46C-n48(2A)-n96C | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46C_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(2A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96C_BCS0                     |                           |
| CA_n46D-n48(2A)-n96C | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46D_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(2A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96C_BCS0                     |                           |
| CA_n46M-n48(2A)-n96C | -                                                             | n46     | CA_n46M_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(2A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96C_BCS0                     |                           |
| CA_n46N-n48(2A)-n96C | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46N_BCS1                     | 0                         |

| NR CA configuration  | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3) | Bandwidth combination set |
|----------------------|---------------------------------------------------------------|---------|----------------------------------|---------------------------|
|                      |                                                               | n48     | CA_n48(2A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96C_BCS0                     |                           |
| CA_n46A-n48(2A)-n96D | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | 10, 20, 40, 60, 80               | 0                         |
|                      |                                                               | n48     | CA_n48(2A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96D_BCS0                     |                           |
|                      |                                                               |         |                                  |                           |
| CA_n46B-n48(2A)-n96D | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46B_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(2A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96D_BCS0                     |                           |
|                      |                                                               |         |                                  |                           |
| CA_n46C-n48(2A)-n96D | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46C_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(2A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96D_BCS0                     |                           |
|                      |                                                               |         |                                  |                           |
| CA_n46D-n48(2A)-n96D | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46D_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(2A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96D_BCS0                     |                           |
|                      |                                                               |         |                                  |                           |
| CA_n46M-n48(2A)-n96D | -                                                             | n46     | CA_n46M_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(2A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96D_BCS0                     |                           |
|                      |                                                               |         |                                  |                           |
| CA_n46N-n48(2A)-n96D | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46N_BCS1                     | 0                         |
|                      |                                                               | n48     | CA_n48(2A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96D_BCS0                     |                           |
|                      |                                                               |         |                                  |                           |
| CA_n46A-n48(2A)-n96E | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | 10, 20, 40, 60, 80               | 0                         |
|                      |                                                               | n48     | CA_n48(2A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96E_BCS0                     |                           |
|                      |                                                               |         |                                  |                           |
| CA_n46B-n48(2A)-n96E | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46B_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(2A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96E_BCS0                     |                           |
|                      |                                                               |         |                                  |                           |
| CA_n46C-n48(2A)-n96E | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46C_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(2A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96E_BCS0                     |                           |
|                      |                                                               |         |                                  |                           |
| CA_n46D-n48(2A)-n96E | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46D_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(2A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96E_BCS0                     |                           |
|                      |                                                               |         |                                  |                           |
| CA_n46M-n48(2A)-n96E | -                                                             | n46     | CA_n46M_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(2A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96E_BCS0                     |                           |
|                      |                                                               |         |                                  |                           |
| CA_n46N-n48(2A)-n96E | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46N_BCS1                     | 0                         |
|                      |                                                               | n48     | CA_n48(2A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96E_BCS0                     |                           |
|                      |                                                               |         |                                  |                           |
| CA_n46A-n48(3A)-n96A | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | 10, 20, 40, 60, 80               | 0                         |
|                      |                                                               | n48     | CA_n48(3A)_BCS0                  |                           |
|                      |                                                               | n96     | 20, 40, 60, 80                   |                           |
|                      |                                                               |         |                                  |                           |
| CA_n46B-n48(3A)-n96A | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46B_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(3A)_BCS0                  |                           |
|                      |                                                               | n96     | 20, 40, 60, 80                   |                           |
|                      |                                                               |         |                                  |                           |
| CA_n46C-n48(3A)-n96A | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46C_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(3A)_BCS0                  |                           |
|                      |                                                               | n96     | 20, 40, 60, 80                   |                           |
|                      |                                                               |         |                                  |                           |

| NR CA configuration  | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3) | Bandwidth combination set |
|----------------------|---------------------------------------------------------------|---------|----------------------------------|---------------------------|
| CA_n46D-n48(3A)-n96A | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46D_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(3A)_BCS0                  |                           |
|                      |                                                               | n96     | 20, 40, 60, 80                   |                           |
| CA_n46M-n48(3A)-n96A | -                                                             | n46     | CA_n46M_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(3A)_BCS0                  |                           |
|                      |                                                               | n96     | 20, 40, 60, 80                   |                           |
| CA_n46N-n48(3A)-n96A | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46N_BCS1                     | 0                         |
|                      |                                                               | n48     | CA_n48(3A)_BCS0                  |                           |
|                      |                                                               | n96     | 20, 40, 60, 80                   |                           |
| CA_n46A-n48(3A)-n96B | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | 10, 20, 40, 60, 80               | 0                         |
|                      |                                                               | n48     | CA_n48(3A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96B_BCS0                     |                           |
| CA_n46B-n48(3A)-n96B | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46B_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(3A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96B_BCS0                     |                           |
| CA_n46C-n48(3A)-n96B | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46C_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(3A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96B_BCS0                     |                           |
| CA_n46D-n48(3A)-n96B | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46D_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(3A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96B_BCS0                     |                           |
| CA_n46M-n48(3A)-n96B | -                                                             | n46     | CA_n46M_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(3A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96B_BCS0                     |                           |
| CA_n46N-n48(3A)-n96B | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46N_BCS1                     | 0                         |
|                      |                                                               | n48     | CA_n48(3A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96B_BCS0                     |                           |
| CA_n46A-n48(3A)-n96C | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | 10, 20, 40, 60, 80               | 0                         |
|                      |                                                               | n48     | CA_n48(3A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96C_BCS0                     |                           |
| CA_n46B-n48(3A)-n96C | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46B_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(3A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96C_BCS0                     |                           |
| CA_n46C-n48(3A)-n96C | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46C_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(3A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96C_BCS0                     |                           |
| CA_n46D-n48(3A)-n96C | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46D_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(3A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96C_BCS0                     |                           |
| CA_n46M-n48(3A)-n96C | -                                                             | n46     | CA_n46M_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(3A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96C_BCS0                     |                           |
| CA_n46N-n48(3A)-n96C | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46N_BCS1                     | 0                         |
|                      |                                                               | n48     | CA_n48(3A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96C_BCS0                     |                           |
| CA_n46A-n48(3A)-n96D | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | 10, 20, 40, 60, 80               | 0                         |

| NR CA configuration  | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3) | Bandwidth combination set |
|----------------------|---------------------------------------------------------------|---------|----------------------------------|---------------------------|
|                      |                                                               | n48     | CA_n48(3A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96D_BCS0                     |                           |
|                      |                                                               |         |                                  |                           |
| CA_n46B-n48(3A)-n96D | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46B_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(3A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96D_BCS0                     |                           |
| CA_n46C-n48(3A)-n96D | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46C_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(3A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96D_BCS0                     |                           |
| CA_n46D-n48(3A)-n96D | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46D_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(3A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96D_BCS0                     |                           |
| CA_n46M-n48(3A)-n96D | -                                                             | n46     | CA_n46M_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(3A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96D_BCS0                     |                           |
| CA_n46N-n48(3A)-n96D | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46N_BCS1                     | 0                         |
|                      |                                                               | n48     | CA_n48(3A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96D_BCS0                     |                           |
| CA_n46A-n48(3A)-n96E | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | 10, 20, 40, 60, 80               | 0                         |
|                      |                                                               | n48     | CA_n48(3A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96E_BCS0                     |                           |
| CA_n46B-n48(3A)-n96E | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46B_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(3A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96E_BCS0                     |                           |
| CA_n46C-n48(3A)-n96E | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46C_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(3A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96E_BCS0                     |                           |
| CA_n46D-n48(3A)-n96E | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46D_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(3A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96E_BCS0                     |                           |
| CA_n46M-n48(3A)-n96E | -                                                             | n46     | CA_n46M_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(3A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96E_BCS0                     |                           |
| CA_n46N-n48(3A)-n96E | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46N_BCS1                     | 0                         |
|                      |                                                               | n48     | CA_n48(3A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96E_BCS0                     |                           |
| CA_n46A-n48(4A)-n96A | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | 10, 20, 40, 60, 80               | 0                         |
|                      |                                                               | n48     | CA_n48(4A)_BCS0                  |                           |
|                      |                                                               | n96     | 20, 40, 60, 80                   |                           |
| CA_n46B-n48(4A)-n96A | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46B_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(4A)_BCS0                  |                           |
|                      |                                                               | n96     | 20, 40, 60, 80                   |                           |
| CA_n46C-n48(4A)-n96A | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46C_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(4A)_BCS0                  |                           |
|                      |                                                               | n96     | 20, 40, 60, 80                   |                           |
| CA_n46D-n48(4A)-n96A | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46D_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(4A)_BCS0                  |                           |
|                      |                                                               | n96     | 20, 40, 60, 80                   |                           |

| NR CA configuration  | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3) | Bandwidth combination set |
|----------------------|---------------------------------------------------------------|---------|----------------------------------|---------------------------|
| CA_n46M-n48(4A)-n96A | -                                                             | n46     | CA_n46M_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(4A)_BCS0                  |                           |
|                      |                                                               | n96     | 20, 40, 60, 80                   |                           |
| CA_n46N-n48(4A)-n96A | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46N_BCS1                     | 0                         |
|                      |                                                               | n48     | CA_n48(4A)_BCS0                  |                           |
|                      |                                                               | n96     | 20, 40, 60, 80                   |                           |
| CA_n46A-n48(4A)-n96B | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | 10, 20, 40, 60, 80               | 0                         |
|                      |                                                               | n48     | CA_n48(4A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96B_BCS0                     |                           |
| CA_n46B-n48(4A)-n96B | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46B_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(4A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96B_BCS0                     |                           |
| CA_n46C-n48(4A)-n96B | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46C_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(4A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96B_BCS0                     |                           |
| CA_n46D-n48(4A)-n96B | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46D_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(4A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96B_BCS0                     |                           |
| CA_n46M-n48(4A)-n96B | -                                                             | n46     | CA_n46M_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(4A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96B_BCS0                     |                           |
| CA_n46N-n48(4A)-n96B | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46N_BCS1                     | 0                         |
|                      |                                                               | n48     | CA_n48(4A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96B_BCS0                     |                           |
| CA_n46A-n48(4A)-n96C | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | 10, 20, 40, 60, 80               | 0                         |
|                      |                                                               | n48     | CA_n48(4A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96C_BCS0                     |                           |
| CA_n46B-n48(4A)-n96C | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46B_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(4A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96C_BCS0                     |                           |
| CA_n46C-n48(4A)-n96C | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46C_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(4A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96C_BCS0                     |                           |
| CA_n46D-n48(4A)-n96C | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46D_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(4A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96C_BCS0                     |                           |
| CA_n46M-n48(4A)-n96C | -                                                             | n46     | CA_n46M_BCS0                     | 0                         |
|                      |                                                               | n48     | CA_n48(4A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96C_BCS0                     |                           |
| CA_n46N-n48(4A)-n96C | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46N_BCS1                     | 0                         |
|                      |                                                               | n48     | CA_n48(4A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96C_BCS0                     |                           |
| CA_n46A-n48(4A)-n96D | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | 10, 20, 40, 60, 80               | 0                         |
|                      |                                                               | n48     | CA_n48(4A)_BCS0                  |                           |
|                      |                                                               | n96     | CA_n96D_BCS0                     |                           |
| CA_n46B-n48(4A)-n96D | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46B_BCS0                     | 0                         |

| NR CA configuration  | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                                                                                                        | Bandwidth combination set |
|----------------------|---------------------------------------------------------------|---------|-----------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
|                      |                                                               | n48     | CA_n48(4A)_BCS0                                                                                                                         |                           |
|                      |                                                               | n96     | CA_n96D_BCS0                                                                                                                            |                           |
| CA_n46C-n48(4A)-n96D | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46C_BCS0                                                                                                                            | 0                         |
|                      |                                                               | n48     | CA_n48(4A)_BCS0                                                                                                                         |                           |
|                      |                                                               | n96     | CA_n96D_BCS0                                                                                                                            |                           |
| CA_n46D-n48(4A)-n96D | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46D_BCS0                                                                                                                            | 0                         |
|                      |                                                               | n48     | CA_n48(4A)_BCS0                                                                                                                         |                           |
|                      |                                                               | n96     | CA_n96D_BCS0                                                                                                                            |                           |
| CA_n46M-n48(4A)-n96D | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46M_BCS0                                                                                                                            | 0                         |
|                      |                                                               | n48     | CA_n48(4A)_BCS0                                                                                                                         |                           |
|                      |                                                               | n96     | CA_n96D_BCS0                                                                                                                            |                           |
| CA_n46N-n48(4A)-n96D | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46N_BCS1                                                                                                                            | 0                         |
|                      |                                                               | n48     | CA_n48(4A)_BCS0                                                                                                                         |                           |
|                      |                                                               | n96     | CA_n96D_BCS0                                                                                                                            |                           |
| CA_n46A-n48(4A)-n96E | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | 10, 20, 40, 60, 80                                                                                                                      | 0                         |
|                      |                                                               | n48     | CA_n48(4A)_BCS0                                                                                                                         |                           |
|                      |                                                               | n96     | CA_n96E_BCS0                                                                                                                            |                           |
| CA_n46B-n48(4A)-n96E | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46B_BCS0                                                                                                                            | 0                         |
|                      |                                                               | n48     | CA_n48(4A)_BCS0                                                                                                                         |                           |
|                      |                                                               | n96     | CA_n96E_BCS0                                                                                                                            |                           |
| CA_n46C-n48(4A)-n96E | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46C_BCS0                                                                                                                            | 0                         |
|                      |                                                               | n48     | CA_n48(4A)_BCS0                                                                                                                         |                           |
|                      |                                                               | n96     | CA_n96E_BCS0                                                                                                                            |                           |
| CA_n46D-n48(4A)-n96E | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46D_BCS0                                                                                                                            | 0                         |
|                      |                                                               | n48     | CA_n48(4A)_BCS0                                                                                                                         |                           |
|                      |                                                               | n96     | CA_n96E_BCS0                                                                                                                            |                           |
| CA_n46M-n48(4A)-n96E | -                                                             | n46     | CA_n46M_BCS0                                                                                                                            | 0                         |
|                      |                                                               | n48     | CA_n48(4A)_BCS0                                                                                                                         |                           |
|                      |                                                               | n96     | CA_n96E_BCS0                                                                                                                            |                           |
| CA_n46N-n48(4A)-n96E | CA_n46A-n48A<br>CA_n48A-n96A                                  | n46     | CA_n46N_BCS1                                                                                                                            | 0                         |
|                      |                                                               | n48     | CA_n48(4A)_BCS0                                                                                                                         |                           |
|                      |                                                               | n96     | CA_n96E_BCS0                                                                                                                            |                           |
| CA_n48A-n66A-n70A    | CA_n48A-n66A<br>CA_n48A-n70A                                  | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> | 0                         |
|                      |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               |                           |
|                      |                                                               | n70     | 5, 10, 15, 20 <sup>1</sup> , 25 <sup>1</sup>                                                                                            |                           |
| CA_n48A-n66(2A)-n70A | CA_n48A-n66A<br>CA_n48A-n70A                                  | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> | 0                         |
|                      |                                                               | n66     | CA_n66(2A)_BCS0                                                                                                                         |                           |
|                      |                                                               | n70     | 5, 10, 15, 20 <sup>1</sup> , 25 <sup>1</sup>                                                                                            |                           |
| CA_n48(2A)-n66A-n70A | CA_n48A-n66A<br>CA_n48A-n70A                                  | n48     | CA_n48(2A)_BCS1                                                                                                                         | 0                         |
|                      |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               |                           |
|                      |                                                               | n70     | 5, 10, 15, 20 <sup>1</sup> , 25 <sup>1</sup>                                                                                            |                           |
| CA_n48B-n66A-n70A    | CA_n48A-n66A<br>CA_n48A-n70A                                  | n48     | CA_n48B_BCS2                                                                                                                            | 0                         |
|                      |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               |                           |
|                      |                                                               | n70     | 5, 10, 15, 20 <sup>1</sup> , 25 <sup>1</sup>                                                                                            |                           |
| CA_n48A-n66A-n71A    | CA_n48A-n66A<br>CA_n48A-n71A<br>CA_n66A-n71A                  | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> | 0                         |

| NR CA configuration  | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                                                                                                        | Bandwidth combination set |
|----------------------|---------------------------------------------------------------|---------|-----------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
|                      |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               |                           |
|                      |                                                               | n71     | 5, 10, 15, 20                                                                                                                           |                           |
| CA_n48A-n66(2A)-n71A | CA_n48A-n66A<br>CA_n48A-n71A<br>CA_n66A-n71A                  | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> | 0                         |
|                      |                                                               | n66     | CA_n66(2A)_BCS0                                                                                                                         |                           |
|                      |                                                               | n71     | 5, 10, 15, 20                                                                                                                           |                           |
| CA_n48(2A)-n66A-n71A | CA_n48A-n66A<br>CA_n48A-n71A<br>CA_n66A-n71A                  | n48     | CA_n48(2A)_BCS1                                                                                                                         | 0                         |
|                      |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               |                           |
|                      |                                                               | n71     | 5, 10, 15, 20                                                                                                                           |                           |
| CA_n48B-n66A-n71A    | CA_n48A-n66A<br>CA_n48A-n71A<br>CA_n66A-n71A                  | n48     | CA_n48B_BCS2                                                                                                                            | 0                         |
|                      |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               |                           |
|                      |                                                               | n71     | 5, 10, 15, 20                                                                                                                           |                           |
| CA_n48A-n66A-n71(2A) | CA_n48A-n66A<br>CA_n48A-n71A<br>CA_n66A-n71A                  | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> | 0                         |
|                      |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               |                           |
|                      |                                                               | n71     | CA_n71(2A)_BCS0                                                                                                                         |                           |
| CA_n48A-n66A-n77A    | n77 <sup>7, 9</sup><br>CA_n48A-n66A<br>CA_n66A-n77A           | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> | 0                         |
|                      |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               |                           |
|                      |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                         |                           |
| CA_n48A-n66A-n77C    | CA_n48A-n66A<br>CA_n66A-n77A<br>CA_n77C                       | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> | 0                         |
|                      |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               |                           |
|                      |                                                               | n77     | CA_n77C_BCS0                                                                                                                            |                           |
|                      |                                                               | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> | 1                         |
|                      |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               |                           |
|                      |                                                               | n77     | CA_n77C_BCS1                                                                                                                            |                           |
| CA_n48B-n66A-n77A    | CA_n48A-n66A<br>CA_n66A-n77A                                  | n48     | CA_n48B_BCS0                                                                                                                            | 0                         |
|                      |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               |                           |
|                      |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                         |                           |
|                      |                                                               | n48     | CA_n48B_BCS1                                                                                                                            | 1                         |
|                      |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               |                           |
|                      |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                         |                           |
|                      |                                                               | n48     | CA_n48B_BCS2                                                                                                                            | 2                         |
|                      |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               |                           |
| CA_n48(2A)-n66A-n77A | CA_n48A-n66A<br>CA_n66A-n77A                                  | n48     | CA_n48(2A)_BCS0                                                                                                                         | 0                         |
|                      |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               |                           |
|                      |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                         |                           |
|                      |                                                               | n48     | CA_n48(2A)_BCS1                                                                                                                         | 1                         |
|                      |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               |                           |
|                      |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                         |                           |

| NR CA configuration  | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                                                                                                        | Bandwidth combination set |
|----------------------|---------------------------------------------------------------|---------|-----------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| CA_n48(2A)-n66A-n77C | CA_n48A-n66A<br>CA_n66A-n77A                                  | n48     | CA_n48(2A)_BCS0                                                                                                                         | 0                         |
|                      |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               |                           |
|                      |                                                               | n77     | CA_n77C_BCS0                                                                                                                            |                           |
|                      |                                                               | n48     | CA_n48(2A)_BCS0                                                                                                                         | 1                         |
|                      |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               |                           |
|                      |                                                               | n77     | CA_n77C_BCS1                                                                                                                            |                           |
|                      |                                                               | n48     | CA_n48(2A)_BCS1                                                                                                                         | 2                         |
|                      |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               |                           |
|                      |                                                               | n77     | CA_n77C_BCS0                                                                                                                            |                           |
|                      |                                                               | n48     | CA_n48(2A)_BCS1                                                                                                                         | 3                         |
|                      |                                                               | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               |                           |
|                      |                                                               | n77     | CA_n77C_BCS1                                                                                                                            |                           |
| CA_n48A-n70A-n71A    | CA_n48A-n70A<br>CA_n48A-n71A<br>CA_n70A-n71A                  | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> | 0                         |
|                      |                                                               | n70     | 5, 10, 15, 20 <sup>1</sup> , 25 <sup>1</sup>                                                                                            |                           |
|                      |                                                               | n71     | 5, 10, 15, 20                                                                                                                           |                           |
| CA_n48(2A)-n70A-n71A | CA_n48A-n70A<br>CA_n48A-n71A<br>CA_n70A-n71A                  | n48     | CA_n48(2A)_BCS1                                                                                                                         | 0                         |
|                      |                                                               | n70     | 5, 10, 15, 20 <sup>1</sup> , 25 <sup>1</sup>                                                                                            |                           |
|                      |                                                               | n71     | 5, 10, 15, 20                                                                                                                           |                           |
| CA_n48B-n70A-n71A    | CA_n48A-n70A<br>CA_n48A-n71A<br>CA_n70A-n71A                  | n48     | CA_n48B_BCS2                                                                                                                            | 0                         |
|                      |                                                               | n70     | 5, 10, 15, 20 <sup>1</sup> , 25 <sup>1</sup>                                                                                            |                           |
|                      |                                                               | n71     | 5, 10, 15, 20                                                                                                                           |                           |
| CA_n48A-n70A-n71(2A) | CA_n48A-n70A<br>CA_n48A-n71A<br>CA_n70A-n71A                  | n48     | 5, 10, 15, 20, 30, 40, 50 <sup>10</sup> , 60 <sup>10</sup> , 70 <sup>10</sup> , 80 <sup>10</sup> , 90 <sup>10</sup> , 100 <sup>10</sup> | 0                         |
|                      |                                                               | n70     | 5, 10, 15, 20 <sup>1</sup> , 25 <sup>1</sup>                                                                                            |                           |
|                      |                                                               | n71     | CA_n71(2A)_BCS0                                                                                                                         |                           |
| CA_n66A-n70A-n71A    | CA_n66A-n71A<br>CA_n70A-n71A                                  | n66     | 5, 10, 15, 20, 40                                                                                                                       | 0                         |
|                      |                                                               | n70     | 5, 10, 15, 20 <sup>1</sup> , 25 <sup>1</sup>                                                                                            |                           |
|                      |                                                               | n71     | 5, 10, 15, 20                                                                                                                           |                           |
| CA_n66A-n70A-n78A    | CA_n66A-n78A<br>CA_n70A-n78A                                  | n66     | 10, 15, 20, 25, 30, 40                                                                                                                  | 0                         |
|                      |                                                               | n70     | 5, 10, 15, 20 <sup>1</sup> , 25 <sup>1</sup>                                                                                            |                           |
|                      |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                         |                           |
| CA_n66A-n70A-n71(2A) | CA_n66A-n71A<br>CA_n70A-n71A                                  | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               | 0                         |
|                      |                                                               | n70     | 5, 10, 15, 20 <sup>1</sup> , 25 <sup>1</sup>                                                                                            |                           |
|                      |                                                               | n71     | CA_n71(2A)_BCS0                                                                                                                         |                           |
| CA_n66B-n70A-n71A    | CA_n66A-n71A<br>CA_n70A-n71A                                  | n66     | CA_n66B_BCS0                                                                                                                            | 0                         |
|                      |                                                               | n70     | 5, 10, 15, 20 <sup>1</sup> , 25 <sup>1</sup>                                                                                            |                           |
|                      |                                                               | n71     | 5, 10, 15, 20                                                                                                                           |                           |
| CA_n66(2A)-n70A-n71A | CA_n66A-n71A<br>CA_n70A-n71A                                  | n66     | CA_n66(2A)_BCS0                                                                                                                         | 0                         |
|                      |                                                               | n70     | 5, 10, 15, 20 <sup>1</sup> , 25 <sup>1</sup>                                                                                            |                           |
|                      |                                                               | n71     | 5, 10, 15, 20                                                                                                                           |                           |
| CA_n66A-n71A-n77A    | CA_n66A-n71A<br>CA_n66A-n77A<br>CA_n71A-n77A                  | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                               | 0                         |
|                      |                                                               | n71     | 5, 10, 15, 20                                                                                                                           |                           |



| NR CA configuration     | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|-------------------------|---------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
|                         | CA_n66A-n71A<br>CA_n66A-n77A<br>CA_n71A-n77A                  | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 4 and 5                   |
|                         |                                                               | n66     | n66 channel bandwidths in Table 5.3.5-1         |                           |
|                         |                                                               | n71     | n71 channel bandwidths in Table 5.3.5-1         |                           |
|                         |                                                               | n77     | n77 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n66A-n71B-n77A       | CA_n66A-n71A<br>CA_n66A-n77A<br>CA_n71A-n77A                  | n66     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                         |                                                               | n71     | CA_n71B_BCS2                                    |                           |
|                         |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                         | CA_n66A-n71A<br>CA_n66A-n77A<br>CA_n71A-n77A                  | n66     | n66 channel bandwidths in Table 5.3.5-1         | 4 and 5                   |
|                         |                                                               | n71     | CA_n71B_BCS 4 and 5                             |                           |
|                         |                                                               | n77     | n77 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n66A-n71(2A)-n77A    | CA_n66A-n71A<br>CA_n66A-n77A<br>CA_n71A-n77A                  | n66     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                         |                                                               | n71     | CA_n71(2A)_BCS0                                 |                           |
|                         |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                         |                                                               | n66     | n66 channel bandwidths in Table 5.3.5-1         | 4 and 5                   |
|                         |                                                               | n71     | CA_n71(2A)_BCS 4 and 5                          |                           |
|                         |                                                               | n77     | n77 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n66(2A)-n71A-n77A    | CA_n66A-n71A<br>CA_n66A-n77A<br>CA_n71A-n77A                  | n66     | CA_n66(2A)_BCS1                                 | 0                         |
|                         |                                                               | n71     | 5, 10, 15, 20                                   |                           |
|                         |                                                               | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                         | CA_n66A-n71A<br>CA_n66A-n77A<br>CA_n71A-n77A                  | n66     | CA_n66(2A)_BCS 4 and 5                          | 4 and 5                   |
|                         |                                                               | n71     | n71 channel bandwidths in Table 5.3.5-1         |                           |
|                         |                                                               | n77     | n77 channel bandwidths in Table 5.3.5-1         |                           |
| CA_n66A-n71A-n77(2A)    | CA_n66A-n71A<br>CA_n66A-n77A<br>CA_n71A-n77A                  | n66     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                         |                                                               | n71     | 5, 10, 15, 20                                   |                           |
|                         |                                                               | n77     | CA_n77(2A)_BCS1                                 |                           |
|                         | CA_n66A-n71A<br>CA_n66A-n77A<br>CA_n71A-n77A                  | n66     | n66 channel bandwidths in Table 5.3.5-1         | 4 and 5                   |
|                         |                                                               | n71     | n71 channel bandwidths in Table 5.3.5-1         |                           |
|                         |                                                               | n77     | CA_n77(2A)_BCS 4 and 5                          |                           |
| CA_n66(2A)-n71A-n77(2A) | CA_n66A-n71A<br>CA_n66A-n77A<br>CA_n71A-n77A                  | n66     | CA_n66(2A)_BCS1                                 | 0                         |
|                         |                                                               | n71     | 5, 10, 15, 20                                   |                           |
|                         |                                                               | n77     | CA_n77(2A)_BCS1                                 |                           |
|                         | CA_n66A-n71A<br>CA_n66A-n77A                                  | n66     | CA_n66(2A)_BCS 4 and 5                          | 4 and 5                   |

| NR CA configuration                                                                                                                                                                     | Uplink CA configuration or single uplink carrier <sup>6</sup> | NR Band | Channel bandwidth (MHz) (NOTE 3)                | Bandwidth combination set |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
|                                                                                                                                                                                         | CA_n71A-n77A                                                  |         |                                                 |                           |
|                                                                                                                                                                                         |                                                               | n71     | n71 channel bandwidths in Table 5.3.5-1         |                           |
|                                                                                                                                                                                         |                                                               | n77     | CA_n77(2A)_BCS 4 and 5                          |                           |
| CA_n66A-n71A-n78A                                                                                                                                                                       | CA_n66A-n71A<br>CA_n66A-n78A<br>CA_n71A-n78A                  | n66     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                                                                                                                                                                                         |                                                               | n71     | 5, 10, 15, 20                                   |                           |
|                                                                                                                                                                                         |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n66A-n71A-n78(2A)                                                                                                                                                                    | CA_n66A-n71A<br>CA_n66A-n78A<br>CA_n71A-n78A                  | n66     | 5, 10, 15, 20, 25, 30, 40                       | 0                         |
|                                                                                                                                                                                         |                                                               | n71     | 5, 10, 15, 20                                   |                           |
|                                                                                                                                                                                         |                                                               | n78     | CA_n78(2A)_BCS2                                 |                           |
| CA_n66(2A)-n71A-n78A                                                                                                                                                                    | CA_n66A-n71A<br>CA_n66A-n78A<br>CA_n71A-n78A                  | n66     | CA_n66(2A)_BCS1                                 | 0                         |
|                                                                                                                                                                                         |                                                               | n71     | 5, 10, 15, 20                                   |                           |
|                                                                                                                                                                                         |                                                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n66(2A)-n71A-n78(2A)                                                                                                                                                                 | CA_n66A-n71A<br>CA_n66A-n78A<br>CA_n71A-n78A                  | n66     | CA_n66(2A)_BCS1                                 | 0                         |
|                                                                                                                                                                                         |                                                               | n71     | 5, 10, 15, 20                                   |                           |
|                                                                                                                                                                                         |                                                               | n78     | CA_n78(2A)_BCS2                                 |                           |
| NOTE 1: This UE channel bandwidth is applicable only to downlink                                                                                                                        |                                                               |         |                                                 |                           |
| NOTE 2: For the 20 MHz bandwidth, the minimum requirements are specified for NR UL carrier frequencies confined to either 713-723 MHz or 728-738 MHz.                                   |                                                               |         |                                                 |                           |
| NOTE 3: For each channel bandwidth of each component carrier, refer to Table 5.3.5-1 for the applicable SCSSs. For a given band, not all UE channel bandwidths support the same SCSSs.. |                                                               |         |                                                 |                           |
| NOTE 4: The minimum requirements only apply for non-simultaneous Tx/Rx between all carriers for TDD combinations.                                                                       |                                                               |         |                                                 |                           |
| NOTE 5: Simultaneous Rx/Tx capability for TDD combinations does not apply for UEs supporting band n78 with an n77 implementation.                                                       |                                                               |         |                                                 |                           |
| NOTE 6: Only single uplink carriers with power class other than PC3 are listed.                                                                                                         |                                                               |         |                                                 |                           |
| NOTE 7: Minimum requirements for Power Class 2 are applicable for this uplink combination or single uplink carrier in this downlink/uplink combination                                  |                                                               |         |                                                 |                           |
| NOTE 8: For this bandwidth, the minimum requirements are restricted to operation when carrier is configured as an SCell part of DC or CA configuration.                                 |                                                               |         |                                                 |                           |
| NOTE 9: Minimum requirements for Power Class 1.5 are applicable for single uplink carrier in this downlink/uplink combination                                                           |                                                               |         |                                                 |                           |
| NOTE 10: For this bandwidth, the minimum requirements are restricted to operation when carrier is configured as a downlink SCell part of CA configuration                               |                                                               |         |                                                 |                           |

### 5.5A.3.3 Configurations for inter-band CA (four bands)

**Table 5.5A.3.3-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (four bands)**

| NR CA configuration | Uplink CA configuration or single uplink carrier <sup>4</sup>      | NR Band | Channel bandwidth (MHz) (NOTE 3) | Bandwidth combination set |
|---------------------|--------------------------------------------------------------------|---------|----------------------------------|---------------------------|
| CA_n1A-n3A-n5A-n7A  | CA_n1A-n3A<br>CA_n1A-n5A<br>CA_n1A-n7A<br>CA_n3A-n5A<br>CA_n3A-n7A | n1      | 5, 10, 15, 20                    | 0                         |

|                     |                                                                                               |     |                                                 |   |
|---------------------|-----------------------------------------------------------------------------------------------|-----|-------------------------------------------------|---|
|                     | CA_n5A-n7A                                                                                    |     |                                                 |   |
|                     |                                                                                               | n3  | 5, 10, 15, 20, 25, 30, 40, 50                   |   |
|                     |                                                                                               | n5  | 5, 10, 15, 20                                   |   |
|                     |                                                                                               | n7  | 5, 10, 15, 20, 25, 30, 40, 50                   |   |
| CA_n1A-n3A-n5A-n7B  | CA_n1A-n3A<br>CA_n1A-n5A<br>CA_n1A-n7A<br>CA_n3A-n5A<br>CA_n3A-n7A<br>CA_n5A-n7A<br>CA_n7B    | n1  | 5, 10, 15, 20                                   | 0 |
|                     |                                                                                               | n3  | 5, 10, 15, 20, 25, 30, 40, 50                   |   |
|                     |                                                                                               | n5  | 5, 10, 15, 20                                   |   |
|                     |                                                                                               | n7  | CA_n7B_BCS0                                     |   |
| CA_n1A-n3A-n5A-n78A | CA_n1A-n3A<br>CA_n1A-n5A<br>CA_n1A-n78A<br>CA_n3A-n5A<br>CA_n3A-n78A<br>CA_n5A-n78A           | n1  | 5, 10, 15, 20, 25, 30, 40, 50                   | 0 |
|                     |                                                                                               | n3  | 5, 10, 15, 20, 25, 30, 40, 50                   |   |
|                     |                                                                                               | n5  | 5, 10, 15, 20                                   |   |
|                     |                                                                                               | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n1A-n3A-n7A-n28A | -                                                                                             | n1  | 5, 10, 15, 20                                   | 0 |
|                     |                                                                                               | n3  | 5, 10, 15, 20, 25, 30                           |   |
|                     |                                                                                               | n7  | 5, 10, 15, 20, 25, 30, 40, 50                   |   |
|                     |                                                                                               | n28 | 5, 10, 15, 20                                   |   |
|                     | CA_n1A-n3A<br>CA_n1A-n7A<br>CA_n1A-n28A<br>CA_n3A-n7A<br>CA_n3A-n28A<br>CA_n7A-n28A           | n1  | 5, 10, 15, 20                                   | 1 |
|                     |                                                                                               | n3  | 5, 10, 15, 20, 25, 30, 40                       |   |
|                     |                                                                                               | n7  | 5, 10, 15, 20, 25, 30, 40, 50                   |   |
|                     |                                                                                               | n28 | 5, 10, 15, 20 <sup>2</sup>                      |   |
| CA_n1A-n3A-n7B-n28A | -                                                                                             | n1  | 5, 10, 15, 20                                   | 0 |
|                     |                                                                                               | n3  | 5, 10, 15, 20, 25, 30                           |   |
|                     |                                                                                               | n7  | CA_n7B_BCS0                                     |   |
|                     |                                                                                               | n28 | 5, 10, 15, 20                                   |   |
|                     | CA_n1A-n3A<br>CA_n1A-n7A<br>CA_n1A-n28A<br>CA_n3A-n7A<br>CA_n3A-n28A<br>CA_n7A-n28A<br>CA_n7B | n1  | 5, 10, 15, 20                                   | 1 |
|                     |                                                                                               | n3  | 5, 10, 15, 20, 25, 30, 40                       |   |
|                     |                                                                                               | n7  | CA_n7B_BCS0                                     |   |
|                     |                                                                                               | n28 | 5, 10, 15, 20                                   |   |
| CA_n1A-n3A-n7A-n78A |                                                                                               | n1  | 5, 10, 15, 20                                   | 0 |
|                     |                                                                                               | n3  | 5, 10, 15, 20, 25, 30                           |   |
|                     |                                                                                               | n7  | 5, 10, 15, 20, 25, 30, 40, 50                   |   |
|                     |                                                                                               | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
|                     | CA_n1A-n3A<br>CA_n1A-n7A<br>CA_n1A-n78A<br>CA_n3A-n7A<br>CA_n3A-n78A<br>CA_n7A-n78A           | n1  | 5, 10, 15, 20                                   | 1 |
|                     |                                                                                               | n3  | 5, 10, 15, 20, 25, 30, 40                       |   |
|                     |                                                                                               | n7  | 5, 10, 15, 20, 25, 30, 40, 50                   |   |
|                     |                                                                                               | n7  | 5, 10, 15, 20, 25, 30, 40, 50                   |   |

|                        |                                                                                               |     |                                                   |   |
|------------------------|-----------------------------------------------------------------------------------------------|-----|---------------------------------------------------|---|
|                        |                                                                                               | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100   | 2 |
|                        |                                                                                               | n1  | 5, 10, 15, 20, 25, 30, 40, 50                     |   |
|                        |                                                                                               | n3  | 5, 10, 15, 20, 25, 30, 40, 50                     |   |
|                        |                                                                                               | n7  | 5, 10, 15, 20, 25, 30, 40, 50                     |   |
|                        |                                                                                               | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100   |   |
| CA_n1A-n3A-n7A-n78(2A) | CA_n1A-n3A<br>CA_n1A-n7A<br>CA_n1A-n78A<br>CA_n3A-n7A<br>CA_n3A-n78A<br>CA_n7A-n78A           | n1  | 5, 10, 15, 20                                     | 0 |
|                        |                                                                                               | n3  | 5, 10, 15, 20, 25, 30, 40                         |   |
|                        |                                                                                               | n7  | 5, 10, 15, 20, 25, 30, 40, 50                     |   |
|                        |                                                                                               | n78 | CA_n78(2A)_BCS2                                   |   |
| CA_n1A-n3A-n7B-n78A    | -                                                                                             | n1  | 5, 10, 15, 20                                     | 0 |
|                        |                                                                                               | n3  | 5, 10, 15, 20, 25, 30                             |   |
|                        |                                                                                               | n7  | CA_n7B_BCS0                                       |   |
|                        |                                                                                               | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100   |   |
|                        | CA_n1A-n3A<br>CA_n1A-n7A<br>CA_n1A-n78A<br>CA_n3A-n7A<br>CA_n3A-n78A<br>CA_n7A-n78A<br>CA_n7B | n1  | 5, 10, 15, 20, 25, 30, 40, 50                     | 1 |
|                        |                                                                                               | n3  | 5, 10, 15, 20, 25, 30, 40, 50                     |   |
|                        |                                                                                               | n7  | CA_n7B_BCS0                                       |   |
|                        |                                                                                               | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100   |   |
| CA_n1A-n3A-n8A-n77A    | -                                                                                             | n1  | 5, 10, 15, 20                                     | 0 |
|                        |                                                                                               | n3  | 5, 10, 15, 20, 25, 30                             |   |
|                        |                                                                                               | n8  | 5, 10, 15, 20                                     |   |
|                        |                                                                                               | n77 | 10, 15, 20, 40, 50, 60, 80, 90, 100               |   |
| CA_n1A-n3A-n8A-n77(2A) | -                                                                                             | n1  | 5, 10, 15, 20                                     | 0 |
|                        |                                                                                               | n3  | 5, 10, 15, 20, 25, 30                             |   |
|                        |                                                                                               | n8  | 5, 10, 15, 20                                     |   |
|                        |                                                                                               | n77 | CA_n77(2A)_BCS1                                   |   |
| CA_n1A-n3A-n8A-n78A    | -                                                                                             | n1  | 5, 10, 15, 20                                     | 0 |
|                        |                                                                                               | n3  | 5, 10, 15, 20, 25, 30                             |   |
|                        |                                                                                               | n8  | 5, 10, 15, 20                                     |   |
|                        |                                                                                               | n78 | 10, 15, 20, 40, 50, 60, 80, 90 <sup>1</sup> , 100 |   |
| CA_n1A-n3A-n18A-n28A   | CA_n1A-n3A<br>CA_n1A-n18A<br>CA_n1A-n28A<br>CA_n3A-n18A<br>CA_n3A-n28A                        | n1  | 5, 10, 15, 20                                     | 0 |
|                        |                                                                                               | n3  | 5, 10, 15, 20                                     |   |
|                        |                                                                                               | n18 | 5, 10, 15                                         |   |
|                        |                                                                                               | n28 | 5, 10                                             |   |
| CA_n1A-n3A-n18A-n41A   | CA_n1A-n3A<br>CA_n1A-n18A<br>CA_n1A-n41A<br>CA_n3A-n18A<br>CA_n3A-n41A<br>CA_n18A-n41A        | n1  | 5, 10, 15, 20                                     | 0 |
|                        |                                                                                               | n3  | 5, 10, 15, 20                                     |   |
|                        |                                                                                               | n18 | 5, 10, 15                                         |   |
|                        |                                                                                               | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100           |   |
| CA_n1A-n3A-n18A-n77A   | CA_n1A-n3A<br>CA_n1A-n18A                                                                     | n1  | 5, 10, 15, 20                                     | 0 |

|                         |                                                                                        |     |                                                   |   |
|-------------------------|----------------------------------------------------------------------------------------|-----|---------------------------------------------------|---|
|                         | CA_n1A-n77A<br>CA_n3A-n18A<br>CA_n3A-n77A<br>CA_n18A-n77A                              |     |                                                   |   |
|                         |                                                                                        | n3  | 5, 10, 15, 20                                     |   |
|                         |                                                                                        | n18 | 5, 10, 15                                         |   |
|                         |                                                                                        | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100   |   |
| CA_n1A-n3A-n28A-n41A    | CA_n1A-n3A<br>CA_n1A-n28A<br>CA_n1A-n41A<br>CA_n3A-n28A<br>CA_n3A-n41A<br>CA_n28A-n41A | n1  | 5, 10, 15, 20                                     | 0 |
|                         |                                                                                        | n3  | 5, 10, 15, 20                                     |   |
|                         |                                                                                        | n28 | 5, 10                                             |   |
|                         |                                                                                        | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100           |   |
| CA_n1A-n3A-n28A-n77A    | CA_n1A-n3A<br>CA_n1A-n28A<br>CA_n1A-n77A<br>CA_n3A-n28A<br>CA_n3A-n77A<br>CA_n28A-n77A | n1  | 5, 10, 15, 20                                     | 0 |
|                         |                                                                                        | n3  | 5, 10, 15, 20, 25, 30                             |   |
|                         |                                                                                        | n28 | 5, 10, 15, 20                                     |   |
|                         |                                                                                        | n77 | 10, 15, 20, 40, 50, 60, 80, 90, 100               |   |
|                         | CA_n1A-n3A<br>CA_n1A-n28A<br>CA_n1A-n77A<br>CA_n3A-n28A<br>CA_n3A-n77A<br>CA_n28A-n77A | n1  | 5, 10, 15, 20                                     | 1 |
|                         |                                                                                        | n3  | 5, 10, 15, 20                                     |   |
|                         |                                                                                        | n28 | 5, 10                                             |   |
|                         |                                                                                        | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100   |   |
| CA_n1A-n3A-n28A-n78A    | -                                                                                      | n1  | 5, 10, 15, 20                                     | 0 |
|                         |                                                                                        | n3  | 5, 10, 15, 20, 25, 30                             |   |
|                         |                                                                                        | n28 | 5, 10, 15, 20 <sup>2</sup>                        |   |
|                         |                                                                                        | n78 | 10, 15, 20, 40, 50, 60, 80, 90 <sup>1</sup> , 100 |   |
|                         | CA_n1A-n3A<br>CA_n1A-n28A<br>CA_n1A-n78A<br>CA_n3A-n28A<br>CA_n3A-n78A<br>CA_n28A-n78A | n1  | 5, 10, 15, 20                                     | 1 |
|                         |                                                                                        | n3  | 5, 10, 15, 20, 25, 30, 40                         |   |
|                         |                                                                                        | n28 | 5, 10, 15, 20 <sup>2</sup>                        |   |
|                         |                                                                                        | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100   |   |
|                         |                                                                                        | n1  | 5, 10, 15, 20, 25, 30, 40, 50                     | 2 |
|                         |                                                                                        | n3  | 5, 10, 15, 20, 25, 30, 40, 50                     |   |
|                         |                                                                                        | n28 | 5, 10, 15, 20 <sup>2</sup> , 30 <sup>2</sup>      |   |
|                         |                                                                                        | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100   |   |
| CA_n1A-n3A-n28A-n78(2A) | CA_n1A-n3A<br>CA_n1A-n28A<br>CA_n1A-n78A<br>CA_n3A-n28A<br>CA_n3A-n78A<br>CA_n28A-n78A | n1  | 5, 10, 15, 20, 25, 30, 40, 50                     | 0 |
|                         |                                                                                        | n3  | 5, 10, 15, 20, 25, 30, 40, 50                     |   |
|                         |                                                                                        | n28 | 5, 10, 15, 20 <sup>2</sup> , 30 <sup>2</sup>      |   |
|                         |                                                                                        | n78 | CA_n78(2A)_BCS2                                   |   |
| CA_n1A-n3A-n28A-n79A    | CA_n1A-n3A<br>CA_n1A-n28A                                                              | n1  | 5, 10, 15, 20                                     | 0 |

|                      |                                                                                               |     |                                                 |   |
|----------------------|-----------------------------------------------------------------------------------------------|-----|-------------------------------------------------|---|
|                      | CA_n1A-n79A<br>CA_n3A-n28A<br>CA_n3A-n79A<br>CA_n28A-n79A                                     |     |                                                 |   |
|                      |                                                                                               | n3  | 5, 10, 15, 20, 25,30                            |   |
|                      |                                                                                               | n28 | 5, 10, 15, 20                                   |   |
|                      |                                                                                               | n79 | 40, 50, 60, 80, 100                             |   |
| CA_n1A-n3A-n41A-n77A | CA_n1A-n3A<br>CA_n1A-n41A<br>CA_n1A-n77A<br>CA_n3A-n41A<br>CA_n3A-n77A<br>CA_n41A-n77A        | n1  | 5, 10, 15, 20                                   | 0 |
|                      |                                                                                               | n3  | 5, 10, 15, 20                                   |   |
|                      |                                                                                               | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100         |   |
|                      |                                                                                               | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n1A-n3A-n77A-n79A | CA_n1A-n3A<br>CA_n1A-n77A<br>CA_n1A-n79A<br>CA_n3A-n77A<br>CA_n3A-n79A<br>CA_n77A-n79A        | n1  | 5, 10, 15, 20                                   | 0 |
|                      |                                                                                               | n3  | 5, 10, 15, 20, 25,30                            |   |
|                      |                                                                                               | n77 | 10, 15, 20, 40, 50, 60, 80, 90, 100             |   |
|                      |                                                                                               | n79 | 40, 50, 60, 80, 100                             |   |
| CA_n1A-n5A-n7A-n78A  | CA_n1A-n5A<br>CA_n1A-n7A<br>CA_n1A-n78A<br>CA_n5A-n7A<br>CA_n5A-n78A                          | n1  | 5, 10, 15, 20, 25, 30, 40, 50                   | 0 |
|                      |                                                                                               | n5  | 5, 10, 15, 20                                   |   |
|                      |                                                                                               | n7  | 5, 10, 15, 20, 25, 30, 40, 50                   |   |
|                      |                                                                                               | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n1A-n5A-n7B-n78A  | CA_n1A-n5A<br>CA_n1A-n7A<br>CA_n1A-n78A<br>CA_n5A-n7A<br>CA_n5A-n78A<br>CA_n7A-n78A<br>CA_n7B | n1  | 5, 10, 15, 20, 25, 30, 40, 50                   | 0 |
|                      |                                                                                               | n5  | 5, 10, 15, 20                                   |   |
|                      |                                                                                               | n7  | CA n7B BCS0                                     |   |
|                      |                                                                                               | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n1A-n7A-n8A-n40A  | CA_n1A-n7A<br>CA_n1A-n8A<br>CA_n1A-n40A<br>CA_n7A-n8A<br>CA_n7A-n40A<br>CA_n8A-n40A           | n1  | 5, 10, 15, 20, 25, 30, 40, 50                   | 0 |
|                      |                                                                                               | n7  | 5, 10, 15, 20, 25, 30, 40, 50                   |   |
|                      |                                                                                               | n8  | 5, 10, 15, 20                                   |   |
|                      |                                                                                               | n40 | 5, 10, 15, 20, 25, 30, 40, 50, 60, 80           |   |
| CA_n1A-n7A-n8A-n78A  | CA_n1A-n7A<br>CA_n1A-n8A<br>CA_n1A-n78A<br>CA_n7A-n8A<br>CA_n7A-n78A<br>CA_n8A-n78A           | n1  | 5, 10, 15, 20, 25, 30, 40, 50                   | 0 |
|                      |                                                                                               | n7  | 5, 10, 15, 20, 25, 30, 40, 50                   |   |
|                      |                                                                                               | n8  | 5, 10, 15, 20                                   |   |
|                      |                                                                                               | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |

|                         |                                                                                                  |     |                                                 |   |
|-------------------------|--------------------------------------------------------------------------------------------------|-----|-------------------------------------------------|---|
| CA_n1A-n7A-n28A-n78A    | CA_n1A-n7A<br>CA_n1A-n28A<br>CA_n1A-n78A<br>CA_n7A-n28A<br>CA_n7A-n78A<br>CA_n28A-n78A           | n1  | 5, 10, 15, 20                                   | 0 |
|                         |                                                                                                  | n7  | 5, 10, 15, 20, 25, 30, 40, 50                   |   |
|                         |                                                                                                  | n28 | 5, 10, 15, 20                                   |   |
|                         |                                                                                                  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n1A-n7B-n28A-n78A    | CA_n1A-n7A<br>CA_n1A-n28A<br>CA_n1A-n78A<br>CA_n7A-n28A<br>CA_n7A-n78A<br>CA_n7B<br>CA_n28A-n78A | n1  | 5, 10, 15, 20                                   | 0 |
|                         |                                                                                                  | n7  | CA_n7B_BCS0                                     |   |
|                         |                                                                                                  | n28 | 5, 10, 15, 20                                   |   |
|                         |                                                                                                  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n1A-n7A-n28A-n78(2A) | CA_n1A-n7A<br>CA_n1A-n28A<br>CA_n1A-n78A<br>CA_n7A-n28A<br>CA_n7A-n78A<br>CA_n28A-n78A           | n1  | 5, 10, 15, 20                                   | 0 |
|                         |                                                                                                  | n7  | 5, 10, 15, 20, 25, 30, 40, 50                   |   |
|                         |                                                                                                  | n28 | 5, 10, 15, 20 <sup>2</sup>                      |   |
|                         |                                                                                                  | n78 | CA_n78(2A)_BCS2                                 |   |
| CA_n1A-n7A-n40A-n78A    | CA_n1A-n7A<br>CA_n1A-n40A<br>CA_n1A-n78A<br>CA_n7A-n40A<br>CA_n7A-n78A<br>CA_n40A-n78A           | n1  | 5, 10, 15, 20, 25, 30, 40, 50                   | 0 |
|                         |                                                                                                  | n7  | 5, 10, 15, 20, 25, 30, 40, 50                   |   |
|                         |                                                                                                  | n40 | 5, 10, 15, 20, 25, 30, 40, 50, 60, 80           |   |
|                         |                                                                                                  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n1A-n8A-n40A-n78A    | CA_n1A-n8A<br>CA_n1A-n40A<br>CA_n1A-n78A<br>CA_n8A-n40A<br>CA_n8A-n78A<br>CA_n40A-n78A           | n1  | 5, 10, 15, 20, 25, 30, 40, 50                   | 0 |
|                         |                                                                                                  | n8  | 5, 10, 15, 20                                   |   |
|                         |                                                                                                  | n40 | 5, 10, 15, 20, 25, 30, 40, 50, 60, 80           |   |
|                         |                                                                                                  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n1A-n8A-n78A-n79A    | -                                                                                                | n1  | 5, 10, 15, 20                                   | 0 |
|                         |                                                                                                  | n8  | 5, 10, 15, 20                                   |   |
|                         |                                                                                                  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
|                         |                                                                                                  | n79 | 40, 50, 60, 80, 100                             |   |
| CA_n1A-n8A-n78(2A)-n79A | -                                                                                                | n1  | 5, 10, 15, 20                                   | 0 |
|                         |                                                                                                  | n8  | 5, 10, 15, 20                                   |   |
|                         |                                                                                                  | n78 | CA_n78(2A)_BCS1                                 |   |
|                         |                                                                                                  | n79 | 40, 50, 60, 80, 100                             |   |
| CA_n1A-n18A-n28A-n41A   | CA_n1A-n18A<br>CA_n1A-n28A<br>CA_n1A-n41A<br>CA_n18A-n28A<br>CA_n18A-n41A<br>CA_n28A-n41A        | n1  | 5, 10, 15, 20                                   | 0 |

|                       |                                                                                           |     |                                                 |   |
|-----------------------|-------------------------------------------------------------------------------------------|-----|-------------------------------------------------|---|
|                       |                                                                                           | n18 | 5, 10, 15                                       |   |
|                       |                                                                                           | n28 | 5, 10                                           |   |
|                       |                                                                                           | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100         |   |
| CA_n1A-n18A-n28A-n77A | CA_n1A-n18A<br>CA_n1A-n28A<br>CA_n1A-n77A<br>CA_n18A-n28A<br>CA_n18A-n77A<br>CA_n28A-n77A | n1  | 5, 10, 15, 20                                   | 0 |
|                       |                                                                                           | n18 | 5, 10, 15                                       |   |
|                       |                                                                                           | n28 | 5, 10                                           |   |
|                       |                                                                                           | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n1A-n18A-n41A-n77A | CA_n1A-n18A<br>CA_n1A-n41A<br>CA_n1A-n77A<br>CA_n18A-n41A<br>CA_n18A-n77A<br>CA_n41A-n77A | n1  | 5, 10, 15, 20                                   | 0 |
|                       |                                                                                           | n18 | 5, 10, 15                                       |   |
|                       |                                                                                           | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100         |   |
|                       |                                                                                           | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n1A-n28A-n40A-n78A | CA_n1A-n28A<br>CA_n1A-n40A<br>CA_n1A-n78A<br>CA_n28A-n40A<br>CA_n28A-n78A<br>CA_n40A-n78A | n1  | 5, 10, 15, 20                                   | 0 |
|                       |                                                                                           | n28 | 5, 10, 15, 20                                   |   |
|                       |                                                                                           | n40 | 5, 10, 15, 20, 25, 30, 40, 50, 60, 80           |   |
|                       |                                                                                           | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n1A-n28A-n40B-n78A | CA_n1A-n28A<br>CA_n1A-n40A<br>CA_n1A-n78A<br>CA_n28A-n40A<br>CA_n28A-n78A<br>CA_n40A-n78A | n1  | 5, 10, 15, 20                                   | 0 |
|                       |                                                                                           | n28 | 5, 10, 15, 20                                   |   |
|                       |                                                                                           | n40 | CA_n40B BCS0                                    |   |
|                       |                                                                                           | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n1A-n28A-n41A-n77A | CA_n1A-n28A<br>CA_n1A-n41A<br>CA_n1A-n77A<br>CA_n28A-n41A<br>CA_n28A-n77A<br>CA_n41A-n77A | n1  | 5, 10, 15, 20                                   | 0 |
|                       |                                                                                           | n28 | 5, 10                                           |   |
|                       |                                                                                           | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100         |   |
|                       |                                                                                           | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n1A-n28A-n77A-n79A | CA_n1A-n28A<br>CA_n1A-n77A<br>CA_n1A-n79A<br>CA_n28A-n77A<br>CA_n28A-n79A<br>CA_n77A-n79A | n1  | 5, 10, 15, 20                                   | 0 |
|                       |                                                                                           | n28 | 5, 10, 15, 20                                   |   |
|                       |                                                                                           | n77 | 10, 15, 20, 40, 50, 60, 80, 90, 100             |   |
|                       |                                                                                           | n79 | 40, 50, 60, 80, 100                             |   |
| CA_n2A-n5A-n30A-n66A  | CA_n2A-n5A<br>CA_n2A-n30A<br>CA_n2A-n66A<br>CA_n5A-n30A<br>CA_n5A-n66A                    | n2  | 5, 10, 15, 20                                   | 0 |



|                         |                                                                                                                                                   |     |                                                                                                                                   |   |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----------------------------------------------------------------------------------------------------------------------------------|---|
|                         | CA_n30A-n66A                                                                                                                                      |     |                                                                                                                                   |   |
|                         |                                                                                                                                                   | n5  | 5, 10, 15, 20                                                                                                                     |   |
|                         |                                                                                                                                                   | n30 | 5, 10                                                                                                                             |   |
|                         |                                                                                                                                                   | n66 | 10, 15, 20, 25, 30, 40                                                                                                            |   |
| CA_n2(2A)-n5A-n30A-n66A | CA_n2A-n5A<br>CA_n2A-n30A<br>CA_n2A-n66A<br>CA_n5A-n30A<br>CA_n5A-n66A<br>CA_n30A-n66A                                                            | n2  | CA_n2(2A)_BCS0                                                                                                                    | 0 |
|                         |                                                                                                                                                   | n5  | 5, 10, 15, 20                                                                                                                     |   |
|                         |                                                                                                                                                   | n30 | 5, 10                                                                                                                             |   |
|                         |                                                                                                                                                   | n66 | 10, 15, 20, 25, 30, 40                                                                                                            |   |
| CA_n2A-n5A-n30A-n66(2A) | CA_n2A-n5A<br>CA_n2A-n30A<br>CA_n2A-n66A<br>CA_n5A-n30A<br>CA_n5A-n66A<br>CA_n30A-n66A                                                            | n2  | 5, 10, 15, 20                                                                                                                     | 0 |
|                         |                                                                                                                                                   | n5  | 5, 10, 15, 20                                                                                                                     |   |
|                         |                                                                                                                                                   | n30 | 5, 10                                                                                                                             |   |
|                         |                                                                                                                                                   | n66 | CA_n66(2A)_BCS1                                                                                                                   |   |
| CA_n2A-n5A-n30A-n77A    | n77 <sup>5</sup><br>CA_n2A-n5A<br>CA_n2A-n30A<br>CA_n2A-n77A <sup>5</sup><br>CA_n5A-n30A<br>CA_n5A-n77A <sup>5</sup><br>CA_n30A-n77A <sup>5</sup> | n2  | 5, 10, 15, 20                                                                                                                     | 0 |
|                         |                                                                                                                                                   | n5  | 5, 10, 15, 20                                                                                                                     |   |
|                         |                                                                                                                                                   | n30 | 5, 10                                                                                                                             |   |
|                         |                                                                                                                                                   | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |   |
| CA_n2A-n5A-n30A-n77(2A) | n77 <sup>5</sup><br>CA_n2A-n5A<br>CA_n2A-n30A<br>CA_n2A-n77A <sup>5</sup><br>CA_n5A-n30A<br>CA_n5A-n77A <sup>5</sup><br>CA_n30A-n77A <sup>5</sup> | n2  | 5, 10, 15, 20                                                                                                                     | 0 |
|                         |                                                                                                                                                   | n5  | 5, 10, 15, 20                                                                                                                     |   |
|                         |                                                                                                                                                   | n30 | 5, 10                                                                                                                             |   |
|                         |                                                                                                                                                   | n77 | CA_n77(2A)_BCS1                                                                                                                   |   |
| CA_n2A-n5A-n48A-n66A    | -                                                                                                                                                 | n2  | 5, 10, 15, 20                                                                                                                     | 0 |
|                         |                                                                                                                                                   | n5  | 5, 10, 15, 20                                                                                                                     |   |
|                         |                                                                                                                                                   | n48 | 5, 10, 15, 20, 30, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 70 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> |   |
|                         |                                                                                                                                                   | n66 | 10, 15, 20, 25, 30, 40                                                                                                            |   |
|                         | CA_n2A-n5A<br>CA_n2A-n48A<br>CA_n2A-n66A<br>CA_n5A-n48A<br>CA_n5A-n66A<br>CA_n48A-n66A                                                            | n2  | 5, 10, 15, 20, 25, 30, 40                                                                                                         | 1 |
|                         |                                                                                                                                                   | n5  | 5, 10, 15, 20, 25                                                                                                                 |   |
|                         |                                                                                                                                                   | n48 | 5, 10, 15, 20, 30, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 70 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> |   |
|                         |                                                                                                                                                   | n66 | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
| CA_n2A-n5A-n48B-n66A    | -                                                                                                                                                 | n2  | 5, 10, 15, 20                                                                                                                     | 0 |
|                         |                                                                                                                                                   | n5  | 5, 10, 15, 20                                                                                                                     |   |
|                         |                                                                                                                                                   | n48 | CA_n48B_BCS2                                                                                                                      |   |
|                         |                                                                                                                                                   | n66 | 10, 15, 20, 25, 30, 40                                                                                                            |   |
|                         | CA_n2A-n5A<br>CA_n2A-n48A<br>CA_n2A-n66A                                                                                                          | n2  | 5, 10, 15, 20, 25, 30, 40                                                                                                         | 1 |

|                          |                                                                                        |     |                                                                                                                                   |   |
|--------------------------|----------------------------------------------------------------------------------------|-----|-----------------------------------------------------------------------------------------------------------------------------------|---|
|                          | CA_n5A-n48A<br>CA_n5A-n66A<br>CA_n48A-n66A                                             |     |                                                                                                                                   | 2 |
|                          |                                                                                        | n5  | 5, 10, 15, 20, 25                                                                                                                 |   |
|                          |                                                                                        | n48 | CA_n48B BCS0                                                                                                                      |   |
|                          |                                                                                        | n66 | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                          |                                                                                        | n2  | 5, 10, 15, 20, 25, 30, 40                                                                                                         | 3 |
|                          |                                                                                        | n5  | 5, 10, 15, 20, 25                                                                                                                 |   |
|                          |                                                                                        | n48 | CA_n48B BCS1                                                                                                                      |   |
|                          |                                                                                        | n66 | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                          |                                                                                        | n2  | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                          |                                                                                        | n5  | 5, 10, 15, 20, 25                                                                                                                 |   |
| CA_n2A-n5A-n48(2A)-n66A  | -                                                                                      | n48 | CA_n48B BCS2                                                                                                                      | 0 |
|                          |                                                                                        | n66 | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                          |                                                                                        | n2  | 5, 10, 15, 20                                                                                                                     |   |
|                          |                                                                                        | n5  | 5, 10, 15, 20                                                                                                                     |   |
|                          | CA_n2A-n5A<br>CA_n2A-n48A<br>CA_n2A-n66A<br>CA_n5A-n48A<br>CA_n5A-n66A<br>CA_n48A-n66A | n48 | CA_n48(2A) BCS1                                                                                                                   | 1 |
|                          |                                                                                        | n66 | 10, 15, 20, 25, 30, 40                                                                                                            |   |
|                          |                                                                                        | n2  | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                          |                                                                                        | n5  | 5, 10, 15, 20, 25                                                                                                                 |   |
|                          |                                                                                        | n48 | CA_n48(2A) BCS0                                                                                                                   |   |
|                          |                                                                                        | n66 | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
| CA_n2A-n5A-n48(A-B)-n66A | -                                                                                      | n2  | 5, 10, 15, 20, 25, 30, 40                                                                                                         | 2 |
|                          |                                                                                        | n5  | 5, 10, 15, 20, 25                                                                                                                 |   |
|                          |                                                                                        | n48 | CA_n48(2A) BCS1                                                                                                                   |   |
|                          |                                                                                        | n66 | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
| CA_n2A-n5A-n48A-n77A     | -                                                                                      | n2  | 5, 10, 15, 20                                                                                                                     | 0 |
|                          |                                                                                        | n5  | 5, 10, 15, 20                                                                                                                     |   |
|                          |                                                                                        | n48 | CA_n48(A-B) BCS1                                                                                                                  |   |
|                          |                                                                                        | n66 | 10, 15, 20, 25, 30, 40                                                                                                            |   |
|                          | CA_n2A-n5A<br>CA_n2A-n48A<br>CA_n2A-n77A<br>CA_n5A-n48A<br>CA_n5A-n77A                 | n2  | 5, 10, 15, 20                                                                                                                     | 1 |
|                          |                                                                                        | n5  | 5, 10, 15, 20, 25                                                                                                                 |   |
|                          |                                                                                        | n48 | 5, 10, 15, 20, 30, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 70 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> |   |
|                          |                                                                                        | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |   |
|                          |                                                                                        | n2  | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                          |                                                                                        | n5  | 5, 10, 15, 20, 25                                                                                                                 |   |
| CA_n2A-n5A-n48A-n77C     | CA_n2A-n5A<br>CA_n2A-n48A<br>CA_n2A-n77A<br>CA_n5A-n48A<br>CA_n5A-n77A                 | n48 | 5, 10, 15, 20, 30, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 70 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> | 0 |
|                          |                                                                                        | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |   |
|                          |                                                                                        | n2  | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                          |                                                                                        | n5  | 5, 10, 15, 20, 25                                                                                                                 |   |
|                          |                                                                                        | n48 | CA_n77C BCS0                                                                                                                      | 1 |
|                          |                                                                                        | n77 | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                          |                                                                                        | n2  | 5, 10, 15, 20, 25, 30, 40                                                                                                         | 1 |
|                          |                                                                                        | n5  | 5, 10, 15, 20, 25                                                                                                                 |   |

|                         |                                                                                                                                                   |     |                                                                                                                                   |   |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----------------------------------------------------------------------------------------------------------------------------------|---|
| CA_n2A-n5A-n48B-n77A    | -                                                                                                                                                 | n48 | 5, 10, 15, 20, 30, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 70 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> | 0 |
|                         |                                                                                                                                                   | n77 | CA_n77C_BCS1                                                                                                                      |   |
|                         |                                                                                                                                                   | n2  | 5, 10, 15, 20                                                                                                                     |   |
|                         |                                                                                                                                                   | n5  | 5, 10, 15, 20                                                                                                                     |   |
|                         |                                                                                                                                                   | n48 | CA_n48B_BCS2                                                                                                                      |   |
|                         | CA_n2A-n5A<br>CA_n2A-n48A<br>CA_n2A-n77A<br>CA_n5A-n48A<br>CA_n5A-n77A                                                                            | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   | 1 |
|                         |                                                                                                                                                   | n2  | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                         |                                                                                                                                                   | n5  | 5, 10, 15, 20, 25                                                                                                                 |   |
|                         |                                                                                                                                                   | n48 | CA_n48B_BCS0                                                                                                                      |   |
|                         |                                                                                                                                                   | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   | 2 |
|                         |                                                                                                                                                   | n2  | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                         |                                                                                                                                                   | n5  | 5, 10, 15, 20, 25                                                                                                                 |   |
|                         |                                                                                                                                                   | n48 | CA_n48B_BCS1                                                                                                                      |   |
|                         |                                                                                                                                                   | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   | 3 |
|                         |                                                                                                                                                   | n2  | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                         |                                                                                                                                                   | n5  | 5, 10, 15, 20, 25                                                                                                                 |   |
|                         |                                                                                                                                                   | n48 | CA_n48B_BCS2                                                                                                                      |   |
|                         |                                                                                                                                                   | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |   |
| CA_n2A-n5A-n48(2A)-n77A | -                                                                                                                                                 | n2  | 5, 10, 15, 20                                                                                                                     | 0 |
|                         |                                                                                                                                                   | n5  | 5, 10, 15, 20                                                                                                                     |   |
|                         |                                                                                                                                                   | n48 | CA_n48(2A)_BCS1                                                                                                                   |   |
|                         |                                                                                                                                                   | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |   |
|                         | CA_n2A-n5A<br>CA_n2A-n48A<br>CA_n2A-n77A<br>CA_n5A-n48A<br>CA_n5A-n77A                                                                            | n2  | 5, 10, 15, 20, 25, 30, 40                                                                                                         | 1 |
|                         |                                                                                                                                                   | n5  | 5, 10, 15, 20, 25                                                                                                                 |   |
|                         |                                                                                                                                                   | n48 | CA_n48(2A)_BCS0                                                                                                                   |   |
|                         |                                                                                                                                                   | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |   |
|                         |                                                                                                                                                   | n2  | 5, 10, 15, 20, 25, 30, 40                                                                                                         | 2 |
|                         |                                                                                                                                                   | n5  | 5, 10, 15, 20, 25                                                                                                                 |   |
|                         |                                                                                                                                                   | n48 | CA_n48(2A)_BCS1                                                                                                                   |   |
|                         |                                                                                                                                                   | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |   |
| CA_n2A-n5A-n66A-n77A    | n77 <sup>5</sup><br>CA_n2A-n5A<br>CA_n2A-n66A<br>CA_n2A-n77A <sup>5</sup><br>CA_n5A-n66A<br>CA_n5A-n77A <sup>5</sup><br>CA_n66A-n77A <sup>5</sup> | n2  | 5, 10, 15, 20                                                                                                                     | 0 |
|                         |                                                                                                                                                   | n5  | 5, 10, 15, 20                                                                                                                     |   |
|                         |                                                                                                                                                   | n66 | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                         |                                                                                                                                                   | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |   |
|                         |                                                                                                                                                   |     |                                                                                                                                   |   |
| CA_n2A-n5A-n66A-n77(2A) | n77 <sup>5</sup><br>CA_n2A-n5A<br>CA_n2A-n66A<br>CA_n2A-n77A <sup>5</sup><br>CA_n5A-n66A<br>CA_n5A-n77A <sup>5</sup><br>CA_n66A-n77A <sup>5</sup> | n2  | 5, 10, 15, 20                                                                                                                     | 0 |
|                         |                                                                                                                                                   | n5  | 5, 10, 15, 20                                                                                                                     |   |

|                          |                                                                                           |     |                                                 |   |
|--------------------------|-------------------------------------------------------------------------------------------|-----|-------------------------------------------------|---|
|                          |                                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                          |                                                                                           | n77 | CA_n77(2A)_BCS1                                 |   |
| CA_n2A-n5A-n66A-n77C     | CA_n2A-n5A<br>CA_n2A-n66A<br>CA_n2A-n77A<br>CA_n5A-n77A<br>CA_n5A-n66A<br>CA_n66A-n77A    | n2  | 5, 10, 15, 20                                   | 0 |
|                          |                                                                                           | n5  | 5, 10, 15, 20                                   |   |
|                          |                                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                          |                                                                                           | n77 | CA_n77C_BCS1                                    |   |
| CA_n2A-n12A-n30A-n66A    | CA_n2A-n12A<br>CA_n2A-n30A<br>CA_n2A-n66A<br>CA_n12A-n30A<br>CA_n12A-n66A<br>CA_n30A-n66A | n2  | 5, 10, 15, 20                                   | 0 |
|                          |                                                                                           | n12 | 5, 10, 15                                       |   |
|                          |                                                                                           | n30 | 5, 10                                           |   |
|                          |                                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
| CA_n2(2A)-n12A-n30A-n66A | CA_n2A-n12A<br>CA_n2A-n30A<br>CA_n2A-n66A<br>CA_n12A-n30A<br>CA_n12A-n66A<br>CA_n30A-n66A | n2  | CA_n2(2A)_BCS0                                  | 0 |
|                          |                                                                                           | n12 | 5, 10, 15                                       |   |
|                          |                                                                                           | n30 | 5, 10                                           |   |
|                          |                                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
| CA_n2A-n12A-n30A-n66(2A) | CA_n2A-n12A<br>CA_n2A-n30A<br>CA_n2A-n66A<br>CA_n12A-n30A<br>CA_n12A-n66A<br>CA_n30A-n66A | n2  | 5, 10, 15, 20                                   | 0 |
|                          |                                                                                           | n12 | 5, 10, 15                                       |   |
|                          |                                                                                           | n30 | 5, 10                                           |   |
|                          |                                                                                           | n66 | CA_n66(2A)_BCS1                                 |   |
| CA_n2A-n12A-n30A-n77A    | CA_n2A-n12A<br>CA_n2A-n30A<br>CA_n2A-n77A<br>CA_n12A-n30A<br>CA_n12A-n77A<br>CA_n30A-n77A | n2  | 5, 10, 15, 20                                   | 0 |
|                          |                                                                                           | n12 | 5, 10, 15                                       |   |
|                          |                                                                                           | n30 | 5, 10                                           |   |
|                          |                                                                                           | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n2A-n12A-n66A-n77A    | CA_n2A-n12A<br>CA_n2A-n66A<br>CA_n2A-n77A<br>CA_n12A-n66A<br>CA_n12A-n77A<br>CA_n66A-n77A | n2  | 5, 10, 15, 20                                   | 0 |
|                          |                                                                                           | n12 | 5, 10, 15                                       |   |
|                          |                                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                          |                                                                                           | n77 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100     |   |
| CA_n2A-n14A-n30A-n66A    | CA_n2A-n14A<br>CA_n2A-n30A<br>CA_n2A-n66A<br>CA_n14A-n30A<br>CA_n14A-n66A<br>CA_n30A-n66A | n2  | 5, 10, 15, 20                                   | 0 |
|                          |                                                                                           | n14 | 5, 10                                           |   |
|                          |                                                                                           | n30 | 5, 10                                           |   |
|                          |                                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |

|                          |                                                                                                                                                      |     |                                                 |   |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-------------------------------------------------|---|
| CA_n2(2A)-n14A-n30A-n66A | CA_n2A-n14A<br>CA_n2A-n30A<br>CA_n2A-n66A<br>CA_n14A-n30A<br>CA_n14A-n66A<br>CA_n30A-n66A                                                            | n2  | CA_n2(2A)_BCS0                                  | 0 |
|                          |                                                                                                                                                      | n14 | 5, 10                                           |   |
|                          |                                                                                                                                                      | n30 | 5, 10                                           |   |
|                          |                                                                                                                                                      | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
| CA_n2A-n14A-n30A-n66(2A) | CA_n2A-n14A<br>CA_n2A-n30A<br>CA_n2A-n66A<br>CA_n14A-n30A<br>CA_n14A-n66A<br>CA_n30A-n66A                                                            | n2  | 5, 10, 15, 20                                   | 0 |
|                          |                                                                                                                                                      | n14 | 5, 10                                           |   |
|                          |                                                                                                                                                      | n30 | 5, 10                                           |   |
|                          |                                                                                                                                                      | n66 | CA_n66(2A)_BCS1                                 |   |
| CA_n2A-n14A-n30A-n77A    | n77 <sup>5</sup><br>CA_n2A-n14A<br>CA_n2A-n30A<br>CA_n2A-n77A <sup>5</sup><br>CA_n14A-n30A<br>CA_n14A-n77A <sup>5</sup><br>CA_n30A-n77A <sup>5</sup> | n2  | 5, 10, 15, 20                                   | 0 |
|                          |                                                                                                                                                      | n14 | 5, 10                                           |   |
|                          |                                                                                                                                                      | n30 | 5, 10                                           |   |
|                          |                                                                                                                                                      | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n2A-n14A-n30A-n77(2A) | n77 <sup>5</sup><br>CA_n2A-n14A<br>CA_n2A-n30A<br>CA_n2A-n77A <sup>5</sup><br>CA_n14A-n30A<br>CA_n14A-n77A <sup>5</sup><br>CA_n30A-n77A <sup>5</sup> | n2  | 5, 10, 15, 20                                   | 0 |
|                          |                                                                                                                                                      | n14 | 5, 10                                           |   |
|                          |                                                                                                                                                      | n30 | 5, 10                                           |   |
|                          |                                                                                                                                                      | n77 | CA_n77(2A)_BCS1                                 |   |
| CA_n2A-n14A-n66A-n77A    | n77 <sup>5</sup><br>CA_n2A-n14A<br>CA_n2A-n66A<br>CA_n2A-n77A <sup>5</sup><br>CA_n14A-n66A<br>CA_n14A-n77A <sup>5</sup><br>CA_n66A-n77A <sup>5</sup> | n2  | 5, 10, 15, 20                                   | 0 |
|                          |                                                                                                                                                      | n14 | 5, 10                                           |   |
|                          |                                                                                                                                                      | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                          |                                                                                                                                                      | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n2A-n14A-n66A-n77(2A) | n77 <sup>5</sup><br>CA_n2A-n14A<br>CA_n2A-n66A<br>CA_n2A-n77A <sup>5</sup><br>CA_n14A-n66A<br>CA_n14A-n77A <sup>5</sup><br>CA_n66A-n77A <sup>5</sup> | n2  | 5, 10, 15, 20                                   | 0 |
|                          |                                                                                                                                                      | n14 | 5, 10                                           |   |
|                          |                                                                                                                                                      | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                          |                                                                                                                                                      | n77 | CA_n77(2A)_BCS1                                 |   |
| CA_n2A-n29A-n30A-n66A    | CA_n2A-n30A<br>CA_n2A-n66A<br>CA_n30A-n66A                                                                                                           | n2  | 5, 10, 15, 20                                   | 0 |
|                          |                                                                                                                                                      | n29 | 5, 10                                           |   |
|                          |                                                                                                                                                      | n30 | 5, 10                                           |   |
|                          |                                                                                                                                                      | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |

|                          |                                                                           |     |                                                                                                                                   |   |
|--------------------------|---------------------------------------------------------------------------|-----|-----------------------------------------------------------------------------------------------------------------------------------|---|
| CA_n2(2A)-n29A-n30A-n66A | CA_n2A-n30A<br>CA_n2A-n66A<br>CA_n30A-n66A                                | n2  | CA_n2(2A)_BCS0                                                                                                                    | 0 |
|                          |                                                                           | n29 | 5, 10                                                                                                                             |   |
|                          |                                                                           | n30 | 5, 10                                                                                                                             |   |
|                          |                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
| CA_n2A-n29A-n30A-n66(2A) | CA_n2A-n30A<br>CA_n2A-n66A<br>CA_n30A-n66A                                | n2  | 5, 10, 15, 20                                                                                                                     | 0 |
|                          |                                                                           | n29 | 5, 10                                                                                                                             |   |
|                          |                                                                           | n30 | 5, 10                                                                                                                             |   |
|                          |                                                                           | n66 | CA_n66(2A)_BCS1                                                                                                                   |   |
| CA_n2A-n29A-n30A-n77A    | CA_n2A-n30A<br>CA_n2A-n77A<br>CA_n30A-n77A                                | n2  | 5, 10, 15, 20                                                                                                                     | 0 |
|                          |                                                                           | n29 | 5, 10                                                                                                                             |   |
|                          |                                                                           | n30 | 5, 10                                                                                                                             |   |
|                          |                                                                           | n77 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100                                                                                       |   |
| CA_n2A-n29A-n66A-n77A    | CA_n2A-n66A<br>CA_n2A-n77A<br>CA_n66A-n77A                                | n2  | 5, 10, 15, 20                                                                                                                     | 0 |
|                          |                                                                           | n29 | 5, 10                                                                                                                             |   |
|                          |                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                          |                                                                           | n77 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100                                                                                       |   |
| CA_n2A-n48A-n66A-n77A    | -                                                                         | n2  | 5, 10, 15, 20                                                                                                                     | 0 |
|                          |                                                                           | n48 | 5, 10, 15, 20, 30, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 70 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> |   |
|                          |                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                          |                                                                           | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |   |
|                          | CA_n2A-n48A<br>CA_n2A-n66A<br>CA_n2A-n77A<br>CA_n48A-n66A<br>CA_n66A-n77A | n2  | 5, 10, 15, 20, 25, 30, 40                                                                                                         | 1 |
|                          |                                                                           | n48 | 5, 10, 15, 20, 30, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 70 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> |   |
|                          |                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                          |                                                                           | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |   |
|                          | -                                                                         | n2  | 5, 10, 15, 20                                                                                                                     | 0 |
|                          |                                                                           | n48 | CA_n48B_BCS1                                                                                                                      |   |
|                          |                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                          |                                                                           | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |   |
|                          | CA_n2A-n48A<br>CA_n2A-n66A<br>CA_n2A-n77A<br>CA_n48A-n66A<br>CA_n66A-n77A | n2  | 5, 10, 15, 20, 25, 30, 40                                                                                                         | 1 |
|                          |                                                                           | n48 | CA_n48B_BCS0                                                                                                                      |   |
|                          |                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                          |                                                                           | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |   |
|                          |                                                                           | n2  | 5, 10, 15, 20, 25, 30, 40                                                                                                         | 2 |
|                          |                                                                           | n48 | CA_n48B_BCS1                                                                                                                      |   |
|                          |                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                          |                                                                           | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |   |
|                          |                                                                           | n2  | 5, 10, 15, 20, 25, 30, 40                                                                                                         | 3 |
|                          |                                                                           | n48 | CA_n48B_BCS2                                                                                                                      |   |
|                          |                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                          |                                                                           | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |   |

|                          |                                                                                     |     |                                                                                                                                   |   |
|--------------------------|-------------------------------------------------------------------------------------|-----|-----------------------------------------------------------------------------------------------------------------------------------|---|
|                          |                                                                                     | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |   |
| CA_n2A-n48(2A)-n66A-n77A | -                                                                                   | n2  | 5, 10, 15, 20                                                                                                                     | 0 |
|                          |                                                                                     | n48 | CA_n48(2A)_BCS1                                                                                                                   |   |
|                          |                                                                                     | n66 | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                          |                                                                                     | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |   |
|                          | CA_n2A-n48A<br>CA_n2A-n66A<br>CA_n2A-n77A<br>CA_n48A-n66A<br>CA_n66A-n77A           | n2  | 5, 10, 15, 20, 25, 30, 40                                                                                                         | 1 |
|                          |                                                                                     | n48 | CA_n48(2A)_BCS0                                                                                                                   |   |
|                          |                                                                                     | n66 | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                          |                                                                                     | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |   |
|                          |                                                                                     | n2  | 5, 10, 15, 20, 25, 30, 40                                                                                                         | 2 |
|                          |                                                                                     | n48 | CA_n48(2A)_BCS1                                                                                                                   |   |
|                          |                                                                                     | n66 | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                          |                                                                                     | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |   |
| CA_n2A-n48A-n66A-n77C    | -                                                                                   | n2  | 5, 10, 15, 20                                                                                                                     | 0 |
|                          |                                                                                     | n48 | 5, 10, 15, 20, 30, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 70 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> |   |
|                          |                                                                                     | n66 | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                          |                                                                                     | n77 | CA_n77C_BCS1                                                                                                                      |   |
|                          | CA_n2A-n48A<br>CA_n2A-n66A<br>CA_n2A-n77A<br>CA_n48A-n66A<br>CA_n66A-n77A           | n2  | 5, 10, 15, 20, 25, 30, 40                                                                                                         | 1 |
|                          |                                                                                     | n48 | 5, 10, 15, 20, 30, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 70 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> |   |
|                          |                                                                                     | n66 | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                          |                                                                                     | n77 | CA_n77C_BCS0                                                                                                                      |   |
|                          |                                                                                     | n2  | 5, 10, 15, 20, 25, 30, 40                                                                                                         | 2 |
|                          |                                                                                     | n48 | 5, 10, 15, 20, 30, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 70 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> |   |
|                          |                                                                                     | n66 | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                          |                                                                                     | n77 | CA_n77C_BCS1                                                                                                                      |   |
| CA_n2A-n66A-n71A-n78A    | -                                                                                   | n2  | 5, 10, 15, 20, 25, 30, 40                                                                                                         | 0 |
|                          |                                                                                     | n66 | 10, 15, 20, 25, 30, 40                                                                                                            |   |
|                          |                                                                                     | n71 | 5, 10, 15, 20                                                                                                                     |   |
|                          |                                                                                     | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |   |
| CA_n3A-n5A-n7A-n78A      | -                                                                                   | n3  | 5, 10, 15, 20, 25, 30, 40                                                                                                         | 0 |
|                          |                                                                                     | n5  | 5, 10, 15, 20                                                                                                                     |   |
|                          |                                                                                     | n7  | 5, 10, 15, 20, 25, 30, 40, 50                                                                                                     |   |
|                          |                                                                                     | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |   |
|                          | CA_n3A-n5A<br>CA_n3A-n7A<br>CA_n3A-n78A<br>CA_n5A-n7A<br>CA_n5A-n78A<br>CA_n7A-n78A | n3  | 5, 10, 15, 20, 25, 30, 40, 50                                                                                                     | 1 |
|                          |                                                                                     | n5  | 5, 10, 15, 20                                                                                                                     |   |
|                          |                                                                                     | n7  | 5, 10, 15, 20, 25, 30, 40, 50                                                                                                     |   |
|                          |                                                                                     | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |   |
|                          |                                                                                     | n3  | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                          |                                                                                     | n5  | 5, 10, 15, 20                                                                                                                     |   |
| CA_n3A-n5A-n7B-n78A      | -                                                                                   | n3  | 5, 10, 15, 20, 25, 30, 40                                                                                                         | 0 |
|                          |                                                                                     | n5  | 5, 10, 15, 20                                                                                                                     |   |

|                         |                                                                                                  |     |                                                 |   |
|-------------------------|--------------------------------------------------------------------------------------------------|-----|-------------------------------------------------|---|
|                         |                                                                                                  | n7  | CA n7B_BCS0                                     | 1 |
|                         |                                                                                                  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
|                         |                                                                                                  | n3  | 5, 10, 15, 20, 25, 30, 40, 50                   |   |
|                         |                                                                                                  | n5  | 5, 10, 15, 20                                   |   |
|                         |                                                                                                  | n7  | CA n7B_BCS0                                     |   |
|                         |                                                                                                  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n3A-n7A-n28A-n78A    | -                                                                                                | n3  | 5, 10, 15, 20, 25, 30                           | 0 |
|                         |                                                                                                  | n7  | 5, 10, 15, 20, 25, 30, 40, 50                   |   |
|                         |                                                                                                  | n28 | 5, 10, 15, 20                                   |   |
|                         |                                                                                                  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
|                         | CA_n3A-n7A<br>CA_n3A-n28A<br>CA_n3A-n78A<br>CA_n7A-n28A<br>CA_n7A-n78A<br>CA_n28A-n78A           | n3  | 5, 10, 15, 20, 25, 30, 40                       | 1 |
|                         |                                                                                                  | n7  | 5, 10, 15, 20, 25, 30, 40, 50                   |   |
|                         |                                                                                                  | n28 | 5, 10, 15, 20 <sup>2</sup>                      |   |
|                         |                                                                                                  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n3A-n7A-n28A-n78(2A) | CA_n3A-n7A<br>CA_n3A-n28A<br>CA_n3A-n78A<br>CA_n7A-n28A<br>CA_n7A-n78A<br>CA_n28A-n78A           | n3  | 5, 10, 15, 20, 25, 30, 40                       | 0 |
|                         |                                                                                                  | n7  | 5, 10, 15, 20, 25, 30, 40, 50                   |   |
|                         |                                                                                                  | n28 | 5, 10, 15, 20 <sup>2</sup>                      |   |
|                         |                                                                                                  | n78 | CA n78(2A)_BCS2                                 |   |
| CA_n3A-n7B-n28A-n78A    | -                                                                                                | n3  | 5, 10, 15, 20, 25, 30                           | 0 |
|                         |                                                                                                  | n7  | CA n7B_BCS0                                     |   |
|                         |                                                                                                  | n28 | 5, 10, 15, 20                                   |   |
|                         |                                                                                                  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
|                         | CA_n3A-n7A<br>CA_n3A-n28A<br>CA_n3A-n78A<br>CA_n7A-n28A<br>CA_n7A-n78A<br>CA_n7B<br>CA_n28A-n78A | n3  | 5, 10, 15, 20, 25, 30, 40                       | 1 |
|                         |                                                                                                  | n7  | CA n7B_BCS0                                     |   |
|                         |                                                                                                  | n28 | 5, 10, 15, 20                                   |   |
|                         |                                                                                                  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n3A-n18A-n28A-n41A   | CA_n3A-n18A<br>CA_n3A-n28A<br>CA_n3A-n41A<br>CA_n18A-n28A<br>CA_n18A-n41A<br>CA_n28A-n41A        | n3  | 5, 10, 15, 20                                   | 0 |
|                         |                                                                                                  | n18 | 5, 10, 15                                       |   |
|                         |                                                                                                  | n28 | 5, 10                                           |   |
|                         |                                                                                                  | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100         |   |



|                          |                                                                                           |     |                                                 |   |
|--------------------------|-------------------------------------------------------------------------------------------|-----|-------------------------------------------------|---|
| CA_n3A-n18A-n28A-n77A    | CA_n3A-n18A<br>CA_n3A-n28A<br>CA_n3A-n77A<br>CA_n18A-n28A<br>CA_n18A-n77A<br>CA_n28A-n77A | n3  | 5, 10, 15, 20                                   | 0 |
|                          |                                                                                           | n18 | 5, 10, 15                                       |   |
|                          |                                                                                           | n28 | 5, 10                                           |   |
|                          |                                                                                           | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n3A-n18A-n41A-n77A    | CA_n3A-n18A<br>CA_n3A-n41A<br>CA_n3A-n77A<br>CA_n18A-n41A<br>CA_n18A-n77A<br>CA_n41A-n77A | n3  | 5, 10, 15, 20                                   | 0 |
|                          |                                                                                           | n18 | 5, 10, 15                                       |   |
|                          |                                                                                           | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100         |   |
|                          |                                                                                           | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n3A-n28A-n41A-n77A    | CA_n3A-n28A<br>CA_n3A-n41A<br>CA_n3A-n77A<br>CA_n28A-n41A<br>CA_n28A-n77A<br>CA_n41A-n77A | n3  | 5, 10, 15, 20, 25, 30, 40                       | 0 |
|                          |                                                                                           | n28 | 5, 10, 15, 20, 30                               |   |
|                          |                                                                                           | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100         |   |
|                          |                                                                                           | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n3A-n28A-n41A-n77(2A) | CA_n3A-n28A<br>CA_n3A-n41A<br>CA_n3A-n77A<br>CA_n28A-n41A<br>CA_n28A-n77A<br>CA_n41A-n77A | n3  | 5, 10, 15, 20, 25, 30, 40                       | 0 |
|                          |                                                                                           | n28 | 5, 10                                           |   |
|                          |                                                                                           | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100         |   |
|                          |                                                                                           | n77 | CA_n77(2A)_BCS0                                 |   |
|                          | CA_n3A-n28A<br>CA_n3A-n41A<br>CA_n3A-n77A<br>CA_n28A-n41A<br>CA_n28A-n77A<br>CA_n41A-n77A | n3  | 5, 10, 15, 20                                   | 1 |
|                          |                                                                                           | n28 | 5, 10                                           |   |
|                          |                                                                                           | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100         |   |
|                          |                                                                                           | n77 | CA_n77(2A)_BCS1                                 |   |
| CA_n3A-n28A-n41A-n78A    | CA_n3A-n28A<br>CA_n3A-n41A<br>CA_n3A-n78A<br>CA_n28A-n41A<br>CA_n28A-n78A<br>CA_n41A-n78A | n3  | 5, 10, 15, 20, 25, 30, 40                       | 0 |
|                          |                                                                                           | n28 | 5, 10, 15, 20                                   |   |
|                          |                                                                                           | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100         |   |
|                          |                                                                                           | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n3A-n28A-n41A-n78(2A) | CA_n3A-n28A<br>CA_n3A-n41A<br>CA_n3A-n78A<br>CA_n28A-n41A<br>CA_n28A-n78A<br>CA_n41A-n78A | n3  | 5, 10, 15, 20, 25, 30, 40                       | 0 |
|                          |                                                                                           | n28 | 5, 10                                           |   |
|                          |                                                                                           | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100         |   |
|                          |                                                                                           | n78 | CA_n78(2A)_BCS2                                 |   |

|                             |                                                                                           |     |                                                 |   |
|-----------------------------|-------------------------------------------------------------------------------------------|-----|-------------------------------------------------|---|
| CA_n3A-n28A-n77A-n79A       | CA_n3A-n28A<br>CA_n3A-n77A<br>CA_n3A-n79A<br>CA_n28A-n77A<br>CA_n28A-n79A<br>CA_n77A-n79A | n3  | 5, 10, 15, 20, 25, 30                           | 0 |
|                             |                                                                                           | n28 | 5, 10, 15, 20                                   |   |
|                             |                                                                                           | n77 | 10, 15, 20, 40, 50, 60, 80, 90, 100             |   |
|                             |                                                                                           | n79 | 40, 50, 80, 100                                 |   |
| CA_n3A-n28A-n77(2A)-n79A    | CA_n3A-n28A<br>CA_n3A-n77A<br>CA_n3A-n79A<br>CA_n28A-n77A<br>CA_n28A-n79A<br>CA_n77A-n79A | n3  | 5, 10, 15, 20, 25, 30                           | 0 |
|                             |                                                                                           | n28 | 5, 10, 15, 20                                   |   |
|                             |                                                                                           | n77 | CA_n77(2A) BCS0                                 |   |
|                             |                                                                                           | n79 | 40, 50, 80, 100                                 |   |
| CA_n5A-n25A-n66A-n77A       | CA_n5A-n25A<br>CA_n5A-n66A<br>CA_n5A-n77A<br>CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A | n5  | 5, 10, 15, 20                                   | 0 |
|                             |                                                                                           | n25 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                             |                                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                             |                                                                                           | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n5A-n25(2A)-n66A-n77A    | CA_n5A-n25A<br>CA_n5A-n66A<br>CA_n5A-n77A<br>CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A | n5  | 5, 10, 15, 20                                   | 0 |
|                             |                                                                                           | n25 | CA_n25(2A) BCS0                                 |   |
|                             |                                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                             |                                                                                           | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n5A-n25A-n66(2A)-n77A    | CA_n5A-n25A<br>CA_n5A-n66A<br>CA_n5A-n77A<br>CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A | n5  | 5, 10, 15, 20                                   | 0 |
|                             |                                                                                           | n25 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                             |                                                                                           | n66 | CA_n66(2A) BCS1                                 |   |
|                             |                                                                                           | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n5A-n25A-n66A-n77(2A)    | CA_n5A-n25A<br>CA_n5A-n66A<br>CA_n5A-n77A<br>CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A | n5  | 5, 10, 15, 20                                   | 0 |
|                             |                                                                                           | n25 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                             |                                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                             |                                                                                           | n77 | CA_n77(2A) BCS1                                 |   |
| CA_n5A-n25(2A)-n66(2A)-n77A | CA_n5A-n25A<br>CA_n5A-n66A<br>CA_n5A-n77A<br>CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A | n5  | 5, 10, 15, 20                                   | 0 |
|                             |                                                                                           | n25 | CA_n25(2A) BCS0                                 |   |
|                             |                                                                                           | n66 | CA_n66(2A) BCS1                                 |   |
|                             |                                                                                           | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |

|                                |                                                                                           |     |                                                 |   |
|--------------------------------|-------------------------------------------------------------------------------------------|-----|-------------------------------------------------|---|
| CA_n5A-n25(2A)-n66A-n77(2A)    | CA_n5A-n25A<br>CA_n5A-n66A<br>CA_n5A-n77A<br>CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A | n5  | 5, 10, 15, 20                                   | 0 |
|                                |                                                                                           | n25 | CA_n25(2A)_BCS0                                 |   |
|                                |                                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                |                                                                                           | n77 | CA_n77(2A)_BCS1                                 |   |
| CA_n5A-n25A-n66(2A)-n77(2A)    | CA_n5A-n25A<br>CA_n5A-n66A<br>CA_n5A-n77A<br>CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A | n5  | 5, 10, 15, 20                                   | 0 |
|                                |                                                                                           | n25 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                |                                                                                           | n66 | CA_n66(2A)_BCS1                                 |   |
|                                |                                                                                           | n77 | CA_n77(2A)_BCS1                                 |   |
| CA_n5A-n25(2A)-n66(2A)-n77(2A) | CA_n5A-n25A<br>CA_n5A-n66A<br>CA_n5A-n77A<br>CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A | n5  | 5, 10, 15, 20                                   | 0 |
|                                |                                                                                           | n25 | CA_n25(2A)_BCS0                                 |   |
|                                |                                                                                           | n66 | CA_n66(2A)_BCS1                                 |   |
|                                |                                                                                           | n77 | CA_n77(2A)_BCS1                                 |   |
| CA_n5A-n25A-n66A-n78A          | CA_n5A-n25A<br>CA_n5A-n66A<br>CA_n5A-n78A<br>CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n66A-n78A | n5  | 5, 10, 15, 20                                   | 0 |
|                                |                                                                                           | n25 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                |                                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                |                                                                                           | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n5A-n25(2A)-n66A-n78A       | CA_n5A-n25A<br>CA_n5A-n66A<br>CA_n5A-n78A<br>CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n66A-n78A | n5  | 5, 10, 15, 20                                   | 0 |
|                                |                                                                                           | n25 | CA_n25(2A)_BCS0                                 |   |
|                                |                                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                |                                                                                           | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n5A-n25A-n66(2A)-n78A       | CA_n5A-n25A<br>CA_n5A-n66A<br>CA_n5A-n78A<br>CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n66A-n78A | n5  | 5, 10, 15, 20                                   | 0 |
|                                |                                                                                           | n25 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                |                                                                                           | n66 | CA_n66(2A)_BCS1                                 |   |
|                                |                                                                                           | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n5A-n25A-n66A-n78(2A)       | CA_n5A-n25A<br>CA_n5A-n66A<br>CA_n5A-n78A<br>CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n66A-n78A | n5  | 5, 10, 15, 20                                   | 0 |
|                                |                                                                                           | n25 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                |                                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                |                                                                                           | n78 | CA_n78(2A)_BCS2                                 |   |

|                                |                                                                                                                                                      |     |                                                                                                                                   |   |
|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----------------------------------------------------------------------------------------------------------------------------------|---|
| CA_n5A-n25(2A)-n66(2A)-n78A    | CA_n5A-n25A<br>CA_n5A-n66A<br>CA_n5A-n78A<br>CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n66A-n78A                                                            | n5  | 5, 10, 15, 20                                                                                                                     | 0 |
|                                |                                                                                                                                                      | n25 | CA_n25(2A)_BCS0                                                                                                                   |   |
|                                |                                                                                                                                                      | n66 | CA_n66(2A)_BCS1                                                                                                                   |   |
|                                |                                                                                                                                                      | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |   |
| CA_n5A-n25(2A)-n66A-n78(2A)    | CA_n5A-n25A<br>CA_n5A-n66A<br>CA_n5A-n78A<br>CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n66A-n78A                                                            | n5  | 5, 10, 15, 20                                                                                                                     | 0 |
|                                |                                                                                                                                                      | n25 | CA_n25(2A)_BCS0                                                                                                                   |   |
|                                |                                                                                                                                                      | n66 | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                                |                                                                                                                                                      | n78 | CA_n78(2A)_BCS2                                                                                                                   |   |
| CA_n5A-n25A-n66(2A)-n78(2A)    | CA_n5A-n25A<br>CA_n5A-n66A<br>CA_n5A-n78A<br>CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n66A-n78A                                                            | n5  | 5, 10, 15, 20                                                                                                                     | 0 |
|                                |                                                                                                                                                      | n25 | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                                |                                                                                                                                                      | n66 | CA_n66(2A)_BCS1                                                                                                                   |   |
|                                |                                                                                                                                                      | n78 | CA_n78(2A)_BCS2                                                                                                                   |   |
| CA_n5A-n25(2A)-n66(2A)-n78(2A) | CA_n5A-n25A<br>CA_n5A-n66A<br>CA_n5A-n78A<br>CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n66A-n78A                                                            | n5  | 5, 10, 15, 20                                                                                                                     | 0 |
|                                |                                                                                                                                                      | n25 | CA_n25(2A)_BCS0                                                                                                                   |   |
|                                |                                                                                                                                                      | n66 | CA_n66(2A)_BCS1                                                                                                                   |   |
|                                |                                                                                                                                                      | n78 | CA_n78(2A)_BCS2                                                                                                                   |   |
| CA_n5A-n30A-n66A-n77A          | n77 <sup>5</sup><br>CA_n5A-n30A<br>CA_n5A-n66A<br>CA_n5A-n77A <sup>5</sup><br>CA_n30A-n66A<br>CA_n30A-n77A <sup>5</sup><br>CA_n66A-n77A <sup>5</sup> | n5  | 5, 10, 15, 20                                                                                                                     | 0 |
|                                |                                                                                                                                                      | n30 | 5, 10                                                                                                                             |   |
|                                |                                                                                                                                                      | n66 | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                                |                                                                                                                                                      | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |   |
| CA_n5A-n30A-n66A-n77(2A)       | n77 <sup>5</sup><br>CA_n5A-n30A<br>CA_n5A-n66A<br>CA_n5A-n77A <sup>5</sup><br>CA_n30A-n66A<br>CA_n30A-n77A <sup>5</sup><br>CA_n66A-n77A <sup>5</sup> | n5  | 5, 10, 15, 20                                                                                                                     | 0 |
|                                |                                                                                                                                                      | n30 | 5, 10                                                                                                                             |   |
|                                |                                                                                                                                                      | n66 | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                                |                                                                                                                                                      | n77 | CA_n77(2A)_BCS1                                                                                                                   |   |
| CA_n5A-n48A-n66A-n77A          | -                                                                                                                                                    | n5  | 5, 10, 15, 20                                                                                                                     | 0 |
|                                |                                                                                                                                                      | n48 | 5, 10, 15, 20, 30, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 70 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> |   |
|                                |                                                                                                                                                      | n66 | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                                |                                                                                                                                                      | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |   |
|                                | CA_n5A-n48A<br>CA_n5A-n66A                                                                                                                           | n5  | 5, 10, 15, 20, 25                                                                                                                 | 1 |

|                          |                                                                           |     |                                                                                                                                   |   |
|--------------------------|---------------------------------------------------------------------------|-----|-----------------------------------------------------------------------------------------------------------------------------------|---|
|                          | CA_n5A-n77A<br>CA_n48A-n66A<br>CA_n66A-n77A                               |     |                                                                                                                                   |   |
|                          |                                                                           | n48 | 5, 10, 15, 20, 30, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 70 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> |   |
|                          |                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                          |                                                                           | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |   |
| CA_n5A-n48A-n66A-n77C    | CA_n5A-n48A<br>CA_n5A-n66A<br>CA_n5A-n77A<br>CA_n48A-n66A<br>CA_n66A-n77A | n5  | 5, 10, 15, 20                                                                                                                     | 0 |
|                          |                                                                           | n48 | 5, 10, 15, 20, 30, 40, 50 <sup>6</sup> , 60 <sup>6</sup> , 70 <sup>6</sup> , 80 <sup>6</sup> , 90 <sup>6</sup> , 100 <sup>6</sup> |   |
|                          |                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                          |                                                                           | n77 | CA_n77C_BCS1                                                                                                                      |   |
| CA_n5A-n48B-n66A-n77A    | -                                                                         | n5  | 5, 10, 15, 20                                                                                                                     | 0 |
|                          |                                                                           | n48 | CA_n48B_BCS1                                                                                                                      |   |
|                          |                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                          |                                                                           | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |   |
|                          | CA_n5A-n48A<br>CA_n5A-n66A<br>CA_n5A-n77A<br>CA_n48A-n66A<br>CA_n66A-n77A | n5  | 5, 10, 15, 20, 25                                                                                                                 | 1 |
|                          |                                                                           | n48 | CA_n48B_BCS0                                                                                                                      |   |
|                          |                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                          |                                                                           | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |   |
|                          |                                                                           | n5  | 5, 10, 15, 20, 25                                                                                                                 | 2 |
|                          |                                                                           | n48 | CA_n48B_BCS1                                                                                                                      |   |
|                          |                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                          |                                                                           | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |   |
|                          |                                                                           | n5  | 5, 10, 15, 20, 25                                                                                                                 | 3 |
|                          |                                                                           | n48 | CA_n48B_BCS2                                                                                                                      |   |
|                          |                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                          |                                                                           | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |   |
| CA_n5A-n48(2A)-n66A-n77A | -                                                                         | n5  | 5, 10, 15, 20                                                                                                                     | 0 |
|                          |                                                                           | n48 | CA_n48(2A)_BCS1                                                                                                                   |   |
|                          |                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                          |                                                                           | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |   |
|                          | CA_n5A-n48A<br>CA_n5A-n66A<br>CA_n5A-n77A<br>CA_n48A-n66A<br>CA_n66A-n77A | n5  | 5, 10, 15, 20, 25                                                                                                                 | 1 |
|                          |                                                                           | n48 | CA_n48(2A)_BCS0                                                                                                                   |   |
|                          |                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                          |                                                                           | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |   |
|                          |                                                                           | n5  | 5, 10, 15, 20, 25                                                                                                                 | 2 |
|                          |                                                                           | n48 | CA_n48(2A)_BCS1                                                                                                                   |   |
|                          |                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                                                                                                         |   |
|                          |                                                                           | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                   |   |
| CA_n7A-n8A-n40A-n78A     | CA_n7A-n8A<br>CA_n7A-n40A<br>CA_n7A-n78A<br>CA_n8A-n40A<br>CA_n8A-n78A    | n7  | 5, 10, 15, 20, 25, 30, 40, 50                                                                                                     | 0 |

|                             |                                                                                           |     |                                                 |   |
|-----------------------------|-------------------------------------------------------------------------------------------|-----|-------------------------------------------------|---|
|                             | CA_n40A-n78A                                                                              |     |                                                 |   |
|                             |                                                                                           | n8  | 5, 10, 15, 20                                   |   |
|                             |                                                                                           | n40 | 5, 10, 15, 20, 25, 30, 40, 50, 60, 80           |   |
|                             |                                                                                           | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n7A-n25A-n66A-n77A       | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n7A-n77A<br>CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A | n7  | 5, 10, 15, 20, 25, 30, 40, 50                   | 0 |
|                             |                                                                                           | n25 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                             |                                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                             |                                                                                           | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n7(2A)-n25A-n66A-n77A    | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n7A-n77A<br>CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A | n7  | CA_n7(2A)_BCS0                                  | 0 |
|                             |                                                                                           | n25 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                             |                                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                             |                                                                                           | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n7A-n25(2A)-n66A-n77A    | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n7A-n77A<br>CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A | n7  | 5, 10, 15, 20, 25, 30, 40, 50                   | 0 |
|                             |                                                                                           | n25 | CA_n25(2A)_BCS0                                 |   |
|                             |                                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                             |                                                                                           | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n7A-n25A-n66(2A)-n77A    | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n7A-n77A<br>CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A | n7  | 5, 10, 15, 20, 25, 30, 40, 50                   | 0 |
|                             |                                                                                           | n25 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                             |                                                                                           | n66 | CA_n66(2A)_BCS1                                 |   |
|                             |                                                                                           | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n7A-n25A-n66A-n77(2A)    | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n7A-n77A<br>CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A | n7  | 5, 10, 15, 20, 25, 30, 40, 50                   | 0 |
|                             |                                                                                           | n25 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                             |                                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                             |                                                                                           | n77 | CA_n77(2A)_BCS1                                 |   |
| CA_n7(2A)-n25(2A)-n66A-n77A | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n7A-n77A<br>CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A | n7  | CA_n7(2A)_BCS0                                  | 0 |
|                             |                                                                                           | n25 | CA_n25(2A)_BCS0                                 |   |
|                             |                                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                             |                                                                                           | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n7(2A)-n25A-n66(2A)-n77A | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n7A-n77A                                                 | n7  | CA_n7(2A)_BCS0                                  | 0 |

|                                |                                                                                           |     |                                                 |   |
|--------------------------------|-------------------------------------------------------------------------------------------|-----|-------------------------------------------------|---|
|                                | CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A                                              |     |                                                 |   |
|                                |                                                                                           | n25 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                |                                                                                           | n66 | CA_n66(2A)_BCS1                                 |   |
|                                |                                                                                           | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n7(2A)-n25A-n66A-n77(2A)    | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n7A-n77A<br>CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A | n7  | CA_n7(2A)_BCS0                                  | 0 |
|                                |                                                                                           | n25 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                |                                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                |                                                                                           | n77 | CA_n77(2A)_BCS1                                 |   |
| CA_n7A-n25(2A)-n66(2A)-n77A    | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n7A-n77A<br>CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A | n7  | 5, 10, 15, 20, 25, 30, 40, 50                   | 0 |
|                                |                                                                                           | n25 | CA_n25(2A)_BCS0                                 |   |
|                                |                                                                                           | n66 | CA_n66(2A)_BCS1                                 |   |
|                                |                                                                                           | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n7A-n25(2A)-n66A-n77(2A)    | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n7A-n77A<br>CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A | n7  | 5, 10, 15, 20, 25, 30, 40, 50                   | 0 |
|                                |                                                                                           | n25 | CA_n25(2A)_BCS0                                 |   |
|                                |                                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                |                                                                                           | n77 | CA_n77(2A)_BCS1                                 |   |
| CA_n7A-n25A-n66(2A)-n77(2A)    | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n7A-n77A<br>CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A | n7  | 5, 10, 15, 20, 25, 30, 40, 50                   | 0 |
|                                |                                                                                           | n25 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                |                                                                                           | n66 | CA_n66(2A)_BCS1                                 |   |
|                                |                                                                                           | n77 | CA_n77(2A)_BCS1                                 |   |
| CA_n7(2A)-n25(2A)-n66(2A)-n77A | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n7A-n77A<br>CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A | n7  | CA_n7(2A)_BCS0                                  | 0 |
|                                |                                                                                           | n25 | CA_n25(2A)_BCS0                                 |   |
|                                |                                                                                           | n66 | CA_n66(2A)_BCS1                                 |   |
|                                |                                                                                           | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n7(2A)-n25A-n66(2A)-n77(2A) | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n7A-n77A<br>CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A | n7  | CA_n7(2A)_BCS0                                  | 0 |
|                                |                                                                                           | n25 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                |                                                                                           | n66 | CA_n66(2A)_BCS1                                 |   |
|                                |                                                                                           | n77 | CA_n77(2A)_BCS1                                 |   |
| CA_n7(2A)-n25(2A)-n66A-n77(2A) | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n7A-n77A<br>CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A | n7  | CA_n7(2A)_BCS0                                  | 0 |
|                                |                                                                                           | n25 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                |                                                                                           | n66 | CA_n66(2A)_BCS1                                 |   |
|                                |                                                                                           | n77 | CA_n77(2A)_BCS1                                 |   |

|                                           |                                                                                           |     |                                                 |   |
|-------------------------------------------|-------------------------------------------------------------------------------------------|-----|-------------------------------------------------|---|
|                                           | CA_n25A-n77A<br>CA_n66A-n77A                                                              |     |                                                 |   |
|                                           |                                                                                           | n25 | CA_n25(2A)_BCS0                                 |   |
|                                           |                                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                           |                                                                                           | n77 | CA_n77(2A)_BCS1                                 |   |
| CA_n7A-n25(2A)-<br>n66(2A)-n77(2A)        | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n7A-n77A<br>CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A | n7  | 5, 10, 15, 20, 25, 30, 40, 50                   | 0 |
|                                           |                                                                                           | n25 | CA_n25(2A)_BCS0                                 |   |
|                                           |                                                                                           | n66 | CA_n66(2A)_BCS1                                 |   |
|                                           |                                                                                           | n77 | CA_n77(2A)_BCS1                                 |   |
| CA_n7(2A)-<br>n25(2A)-n66(2A)-<br>n77(2A) | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n7A-n77A<br>CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A | n7  | CA_n7(2A)_BCS0                                  | 0 |
|                                           |                                                                                           | n25 | CA_n25(2A)_BCS0                                 |   |
|                                           |                                                                                           | n66 | CA_n66(2A)_BCS1                                 |   |
|                                           |                                                                                           | n77 | CA_n77(2A)_BCS1                                 |   |
| CA_n7A-n25A-<br>n66A-n78A                 | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n7A-n78A<br>CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n66A-n78A | n7  | 5, 10, 15, 20, 25, 30, 40, 50                   | 0 |
|                                           |                                                                                           | n25 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                           |                                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                           |                                                                                           | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n7A-n25(2A)-<br>n66A-n78A              | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n7A-n78A<br>CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n66A-n78A | n7  | 5, 10, 15, 20, 25, 30, 40, 50                   | 0 |
|                                           |                                                                                           | n25 | CA_n25(2A)_BCS0                                 |   |
|                                           |                                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                           |                                                                                           | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n7A-n25A-<br>n66(2A)-n78A              | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n7A-n78A<br>CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n66A-n78A | n7  | 5, 10, 15, 20, 25, 30, 40, 50                   | 0 |
|                                           |                                                                                           | n25 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                           |                                                                                           | n66 | CA_n66(2A)_BCS1                                 |   |
|                                           |                                                                                           | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n7A-n25A-<br>n66A-n78(2A)              | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n7A-n78A<br>CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n66A-n78A | n7  | 5, 10, 15, 20, 25, 30, 40, 50                   | 0 |
|                                           |                                                                                           | n25 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                           |                                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                           |                                                                                           | n78 | CA_n78(2A)_BCS2                                 |   |
| CA_n7(2A)-n25A-<br>n66A-n78A              | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n7A-n78A<br>CA_n25A-n66A<br>CA_n25A-n78A                 | n7  | CA_n7(2A)_BCS0                                  | 0 |
|                                           |                                                                                           |     |                                                 |   |
|                                           |                                                                                           |     |                                                 |   |
|                                           |                                                                                           |     |                                                 |   |



|                                |                                                                                           |     |                                                 |   |
|--------------------------------|-------------------------------------------------------------------------------------------|-----|-------------------------------------------------|---|
|                                | CA_n66A-n78A                                                                              |     |                                                 |   |
|                                |                                                                                           | n25 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                |                                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                |                                                                                           | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n7A-n25(2A)-n66A-n78(2A)    | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n7A-n78A<br>CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n66A-n78A | n7  | 5, 10, 15, 20, 25, 30, 40, 50                   | 0 |
|                                |                                                                                           | n25 | CA_n25(2A)_BCS0                                 |   |
|                                |                                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                |                                                                                           | n78 | CA_n78(2A)_BCS2                                 |   |
| CA_n7A-n25(2A)-n66(2A)-n78A    | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n7A-n78A<br>CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n66A-n78A | n7  | 5, 10, 15, 20, 25, 30, 40, 50                   | 0 |
|                                |                                                                                           | n25 | CA_n25(2A)_BCS0                                 |   |
|                                |                                                                                           | n66 | CA_n66(2A)_BCS1                                 |   |
|                                |                                                                                           | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n7A-n25A-n66(2A)-n78(2A)    | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n7A-n78A<br>CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n66A-n78A | n7  | 5, 10, 15, 20, 25, 30, 40, 50                   | 0 |
|                                |                                                                                           | n25 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                |                                                                                           | n66 | CA_n66(2A)_BCS1                                 |   |
|                                |                                                                                           | n78 | CA_n78(2A)_BCS2                                 |   |
| CA_n7(2A)-n25(2A)-n66A-n78A    | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n7A-n78A<br>CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n66A-n78A | n7  | CA_n7(2A)_BCS0                                  | 0 |
|                                |                                                                                           | n25 | CA_n25(2A)_BCS0                                 |   |
|                                |                                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                |                                                                                           | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n7(2A)-n25A-n66(2A)-n78A    | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n7A-n78A<br>CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n66A-n78A | n7  | CA_n7(2A)_BCS0                                  | 0 |
|                                |                                                                                           | n25 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                |                                                                                           | n66 | CA_n66(2A)_BCS1                                 |   |
|                                |                                                                                           | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n7(2A)-n25A-n66A-n78(2A)    | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n7A-n78A<br>CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n66A-n78A | n7  | CA_n7(2A)_BCS0                                  | 0 |
|                                |                                                                                           | n25 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                |                                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                |                                                                                           | n78 | CA_n78(2A)_BCS2                                 |   |
| CA_n7A-n25(2A)-n66(2A)-n78(2A) | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n7A-n78A<br>CA_n25A-n66A<br>CA_n25A-n78A                 | n7  | 5, 10, 15, 20, 25, 30, 40, 50                   | 0 |
|                                |                                                                                           | n25 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                |                                                                                           | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                |                                                                                           | n78 | 5, 10, 15, 20, 25, 30, 40, 50                   |   |

|                                           |                                                                                                                            |     |                                                 |   |
|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|-----|-------------------------------------------------|---|
|                                           | CA_n66A-n78A                                                                                                               |     |                                                 |   |
|                                           |                                                                                                                            | n25 | CA_n25(2A)_BCS0                                 |   |
|                                           |                                                                                                                            | n66 | CA_n66(2A)_BCS1                                 |   |
|                                           |                                                                                                                            | n78 | CA_n78(2A)_BCS2                                 |   |
| CA_n7(2A)-<br>n25(2A)-n66A-<br>n78(2A)    | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n7A-n78A<br>CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n66A-n78A                                  | n7  | CA_n7(2A)_BCS0                                  | 0 |
|                                           |                                                                                                                            | n25 | CA_n25(2A)_BCS0                                 |   |
|                                           |                                                                                                                            | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                           |                                                                                                                            | n78 | CA_n78(2A)_BCS2                                 |   |
| CA_n7(2A)-<br>n25(2A)-n66(2A)-<br>n78A    | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n7A-n78A<br>CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n66A-n78A                                  | n7  | CA_n7(2A)_BCS0                                  | 0 |
|                                           |                                                                                                                            | n25 | CA_n25(2A)_BCS0                                 |   |
|                                           |                                                                                                                            | n66 | CA_n66(2A)_BCS1                                 |   |
|                                           |                                                                                                                            | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n7(2A)-n25A-<br>n66(2A)-n78(2A)        | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n7A-n78A<br>CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n66A-n78A                                  | n7  | CA_n7(2A)_BCS0                                  | 0 |
|                                           |                                                                                                                            | n25 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                           |                                                                                                                            | n66 | CA_n66(2A)_BCS1                                 |   |
|                                           |                                                                                                                            | n78 | CA_n78(2A)_BCS2                                 |   |
| CA_n7(2A)-<br>n25(2A)-n66(2A)-<br>n78(2A) | CA_n7A-n25A<br>CA_n7A-n66A<br>CA_n7A-n78A<br>CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n66A-n78A                                  | n7  | CA_n7(2A)_BCS0                                  | 0 |
|                                           |                                                                                                                            | n25 | CA_n25(2A)_BCS0                                 |   |
|                                           |                                                                                                                            | n66 | CA_n66(2A)_BCS1                                 |   |
|                                           |                                                                                                                            | n78 | CA_n78(2A)_BCS2                                 |   |
| CA_n12A-n30A-<br>n66A-n77A                | CA_n12A-n30A<br>CA_n12A-n66A<br>CA_n12A-n77A<br>CA_n30A-n66A<br>CA_n30A-n77A<br>CA_n66A-n77A                               | n12 | 5, 10, 15                                       | 0 |
|                                           |                                                                                                                            | n30 | 5, 10                                           |   |
|                                           |                                                                                                                            | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                           |                                                                                                                            | n77 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100     |   |
| CA_n13A-n25A-<br>n66A-n77A                | CA_n13A-n25A<br>CA_n13A-n66A<br>CA_n13A-n77A<br>CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n66A-n77A                               | n13 | 5, 10                                           | 0 |
|                                           |                                                                                                                            | n25 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                           |                                                                                                                            | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                           |                                                                                                                            | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n14A-n30A-<br>n66A-n77A                | n77 <sup>5</sup><br>CA_n14A-n30A<br>CA_n14A-n66A<br>CA_n14A-n77A <sup>5</sup><br>CA_n30A-n66A<br>CA_n30A-n77A <sup>5</sup> | n14 | 5, 10                                           | 0 |

|                              |                                                                                                                                                         |     |                                                 |   |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-------------------------------------------------|---|
|                              | CA_n66A-n77A <sup>5</sup>                                                                                                                               |     |                                                 |   |
|                              |                                                                                                                                                         | n30 | 5, 10                                           |   |
|                              |                                                                                                                                                         | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                              |                                                                                                                                                         | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n14A-n30A-n66A-n77(2A)    | n77 <sup>5</sup><br>CA_n14A-n30A<br>CA_n14A-n66A<br>CA_n14A-n77A <sup>5</sup><br>CA_n30A-n66A<br>CA_n30A-n77A <sup>5</sup><br>CA_n66A-n77A <sup>5</sup> | n14 | 5, 10                                           | 0 |
|                              |                                                                                                                                                         | n30 | 5, 10                                           |   |
|                              |                                                                                                                                                         | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                              |                                                                                                                                                         | n77 | CA_n77(2A)_BCS1                                 |   |
| CA_n18A-n28A-n41A-n77A       | CA_n18A-n28A<br>CA_n18A-n41A<br>CA_n18A-n77A<br>CA_n28A-n41A<br>CA_n28A-n77A<br>CA_n41A-n77A                                                            | n18 | 5, 10, 15                                       | 0 |
|                              |                                                                                                                                                         | n28 | 5, 10                                           |   |
|                              |                                                                                                                                                         | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100         |   |
|                              |                                                                                                                                                         | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n25A-n38A-n66A-n78A       | CA_n25A-n38A<br>CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n38A-n66A<br>CA_n38A-n78A<br>CA_n66A-n78A                                                            | n25 | 5, 10, 15, 20, 25, 30, 40                       | 0 |
|                              |                                                                                                                                                         | n38 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                              |                                                                                                                                                         | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                              |                                                                                                                                                         | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n25(2A)-n38A-n66A-n78A    | CA_n25A-n38A<br>CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n38A-n66A<br>CA_n38A-n78A<br>CA_n66A-n78A                                                            | n25 | CA_n25(2A)_BCS0                                 | 0 |
|                              |                                                                                                                                                         | n38 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                              |                                                                                                                                                         | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                              |                                                                                                                                                         | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n25A-n38A-n66(2A)-n78A    | CA_n25A-n38A<br>CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n38A-n66A<br>CA_n38A-n78A<br>CA_n66A-n78A                                                            | n25 | 5, 10, 15, 20, 25, 30, 40                       | 0 |
|                              |                                                                                                                                                         | n38 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                              |                                                                                                                                                         | n66 | CA_n66(2A)_BCS1                                 |   |
|                              |                                                                                                                                                         | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n25A-n38A-n66A-n78(2A)    | CA_n25A-n38A<br>CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n38A-n66A<br>CA_n38A-n78A<br>CA_n66A-n78A                                                            | n25 | 5, 10, 15, 20, 25, 30, 40                       | 0 |
|                              |                                                                                                                                                         | n38 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                              |                                                                                                                                                         | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                              |                                                                                                                                                         | n78 | CA_n78(2A)_BCS2                                 |   |
| CA_n25(2A)-n38A-n66(2A)-n78A | CA_n25A-n38A<br>CA_n25A-n66A<br>CA_n25A-n78A                                                                                                            | n25 | CA_n25(2A)_BCS0                                 | 0 |

|                                 |                                                                                              |     |                                                 |         |
|---------------------------------|----------------------------------------------------------------------------------------------|-----|-------------------------------------------------|---------|
|                                 | CA_n38A-n66A<br>CA_n38A-n78A<br>CA_n66A-n78A                                                 |     |                                                 |         |
|                                 |                                                                                              | n38 | 5, 10, 15, 20, 25, 30, 40                       |         |
|                                 |                                                                                              | n66 | CA_n66(2A)_BCS1                                 |         |
|                                 |                                                                                              | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |         |
| CA_n25(2A)-n38A-n66A-n78(2A)    | CA_n25A-n38A<br>CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n38A-n66A<br>CA_n38A-n78A<br>CA_n66A-n78A | n25 | CA_n25(2A)_BCS0                                 | 0       |
|                                 |                                                                                              | n38 | 5, 10, 15, 20, 25, 30, 40                       |         |
|                                 |                                                                                              | n66 | 5, 10, 15, 20, 25, 30, 40                       |         |
|                                 |                                                                                              | n78 | CA_n78(2A)_BCS2                                 |         |
| CA_n25A-n38A-n66(2A)-n78(2A)    | CA_n25A-n38A<br>CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n38A-n66A<br>CA_n38A-n78A<br>CA_n66A-n78A | n25 | 5, 10, 15, 20, 25, 30, 40                       | 0       |
|                                 |                                                                                              | n38 | 5, 10, 15, 20, 25, 30, 40                       |         |
|                                 |                                                                                              | n66 | CA_n66(2A)_BCS1                                 |         |
|                                 |                                                                                              | n78 | CA_n78(2A)_BCS2                                 |         |
| CA_n25(2A)-n38A-n66(2A)-n78(2A) | CA_n25A-n38A<br>CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n38A-n66A<br>CA_n38A-n78A<br>CA_n66A-n78A | n25 | CA_n25(2A)_BCS0                                 | 0       |
|                                 |                                                                                              | n38 | 5, 10, 15, 20, 25, 30, 40                       |         |
|                                 |                                                                                              | n66 | CA_n66(2A)_BCS1                                 |         |
|                                 |                                                                                              | n78 | CA_n78(2A)_BCS2                                 |         |
| CA_n25A-n41A-n66A-n71A          | -                                                                                            | n25 | 5, 10, 15, 20                                   | 0       |
|                                 |                                                                                              | n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100         |         |
|                                 |                                                                                              | n66 | 5, 10, 15, 20, 40                               |         |
|                                 |                                                                                              | n71 | 5, 10, 15, 20                                   |         |
|                                 | CA_n25A-n41A<br>CA_n25A-n66A<br>CA_n25A-n71A<br>CA_n41A-n66A<br>CA_n41A-n71A<br>CA_n66A-n71A | n25 | 5, 10, 15, 20, 25, 30, 40                       | 1       |
|                                 |                                                                                              | n41 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100     |         |
|                                 |                                                                                              | n66 | 5, 10, 15, 20, 25, 30, 40                       |         |
|                                 |                                                                                              | n71 | 5, 10, 15, 20                                   |         |
|                                 |                                                                                              | n25 | n25 channel bandwidths in Table 5.3.5-1         | 4 and 5 |
|                                 |                                                                                              | n41 | n41 channel bandwidths in Table 5.3.5-1         |         |
|                                 |                                                                                              | n66 | n66 channel bandwidths in Table 5.3.5-1         |         |
|                                 |                                                                                              | n71 | n71 channel bandwidths in Table 5.3.5-1         |         |
| CA_n25A-n41(2A)-n66A-n71A       | -                                                                                            | n25 | 5, 10, 15, 20                                   | 0       |
|                                 |                                                                                              | n41 | CA_n41(2A)_BCS0                                 |         |
|                                 |                                                                                              | n66 | 5, 10, 15, 20                                   |         |
|                                 |                                                                                              | n71 | 5, 10, 15, 20                                   |         |
|                                 | CA_n25A-n41A<br>CA_n25A-n66A                                                                 | n25 | 5, 10, 15, 20, 25, 30, 40                       | 1       |

|                        |                                                                                                         |     |                                                                    |         |
|------------------------|---------------------------------------------------------------------------------------------------------|-----|--------------------------------------------------------------------|---------|
|                        | CA_n25A-n71A<br>CA_n41A-n66A<br>CA_n41A-n71A<br>CA_n66A-n71A                                            |     |                                                                    | 4 and 5 |
|                        |                                                                                                         | n41 | CA_n41(2A)_BCS1                                                    |         |
|                        |                                                                                                         | n66 | 5, 10, 15, 20, 25, 30, 40                                          |         |
|                        |                                                                                                         | n71 | 5, 10, 15, 20                                                      |         |
|                        |                                                                                                         | n25 | n25 channel bandwidths in Table 5.3.5-1                            |         |
|                        |                                                                                                         | n41 | See CA_n41(2A) Bandwidth Combination Set 4 and 5 in Table 5.5A.2-1 |         |
|                        |                                                                                                         | n66 | n66 channel bandwidths in Table 5.3.5-1                            |         |
|                        |                                                                                                         | n71 | n71 channel bandwidths in Table 5.3.5-1                            |         |
| CA_n25A-n41C-n66A-n71A | -                                                                                                       | n25 | 5, 10, 15, 20                                                      | 0       |
|                        |                                                                                                         | n41 | CA_n41C_BCS0                                                       |         |
|                        |                                                                                                         | n66 | 5, 10, 15, 20, 40                                                  |         |
|                        |                                                                                                         | n71 | 5, 10, 15, 20                                                      |         |
|                        | CA_n25A-n41A<br>CA_n25A-n66A<br>CA_n25A-n71A<br>CA_n41A-n66A<br>CA_n41A-n71A<br>CA_n41C<br>CA_n66A-n71A | n25 | 5, 10, 15, 20, 25, 30, 40                                          | 1       |
|                        |                                                                                                         | n41 | CA_n41C_BCS1                                                       |         |
|                        |                                                                                                         | n66 | 5, 10, 15, 20, 25, 30, 40                                          |         |
|                        |                                                                                                         | n71 | 5, 10, 15, 20                                                      |         |
|                        |                                                                                                         | n25 | n25 channel bandwidths in Table 5.3.5-1                            | 4 and 5 |
|                        |                                                                                                         | n41 | See CA_n41C Bandwidth Combination Set 4 and 5 in Table 5.5A.1-1    |         |
|                        |                                                                                                         | n66 | n66 channel bandwidths in Table 5.3.5-1                            |         |
|                        |                                                                                                         | n71 | n71 channel bandwidths in Table 5.3.5-1                            |         |
| CA_n25A-n41A-n66A-n77A | CA_n25A-n41A<br>CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n41A-n66A<br>CA_n41A-n77A<br>CA_n66A-n77A            | n25 | 5, 10, 15, 20, 25, 30, 40                                          | 0       |
|                        |                                                                                                         | n41 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100                        |         |
|                        |                                                                                                         | n66 | 5, 10, 15, 20, 25, 30, 40                                          |         |
|                        |                                                                                                         | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                    |         |
|                        |                                                                                                         | n25 | n25 channel bandwidths in Table 5.3.5-1                            | 4 and 5 |
|                        |                                                                                                         | n41 | n41 channel bandwidths in Table 5.3.5-1                            |         |
|                        |                                                                                                         | n66 | n66 channel bandwidths in Table 5.3.5-1                            |         |
|                        |                                                                                                         | n77 | n77 channel bandwidths in Table 5.3.5-1                            |         |
| CA_n25A-n41C-n66A-n77A | CA_n25A-n41A<br>CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n41A-n66A                                            | n25 | 5, 10, 15, 20, 25, 30, 40                                          | 0       |

|                           |                                                                                              |     |                                                                    |         |
|---------------------------|----------------------------------------------------------------------------------------------|-----|--------------------------------------------------------------------|---------|
|                           | CA_n41A-n77A<br>CA_n41C<br>CA_n66A-n77A                                                      |     |                                                                    | 4 and 5 |
|                           |                                                                                              | n41 | CA_n41C_BCS1                                                       |         |
|                           |                                                                                              | n66 | 5, 10, 15, 20, 25, 30, 40                                          |         |
|                           |                                                                                              | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                    |         |
|                           |                                                                                              | n25 | n25 channel bandwidths in Table 5.3.5-1                            |         |
|                           |                                                                                              | n41 | See CA_n41C Bandwidth Combination Set 4 and 5 in Table 5.5A.1-1    |         |
|                           |                                                                                              | n66 | n66 channel bandwidths in Table 5.3.5-1                            |         |
|                           |                                                                                              | n77 | n77 channel bandwidths in Table 5.3.5-1                            |         |
| CA_n25A-n41(2A)-n66A-n77A | CA_n25A-n41A<br>CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n41A-n66A<br>CA_n41A-n77A<br>CA_n66A-n77A | n25 | 5, 10, 15, 20, 25, 30, 40                                          | 0       |
|                           |                                                                                              | n41 | CA_n41(2A)_BCS1                                                    |         |
|                           |                                                                                              | n66 | 5, 10, 15, 20, 25, 30, 40                                          |         |
|                           |                                                                                              | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                    |         |
|                           |                                                                                              | n25 | n25 channel bandwidths in Table 5.3.5-1                            | 4 and 5 |
|                           |                                                                                              | n41 | See CA_n41(2A) Bandwidth Combination Set 4 and 5 in Table 5.5A.1-2 |         |
|                           |                                                                                              | n66 | n66 channel bandwidths in Table 5.3.5-1                            |         |
|                           |                                                                                              | n77 | n77 channel bandwidths in Table 5.3.5-1                            |         |
| CA_n25A-n41A-n66A-n77(2A) | CA_n25A-n41A<br>CA_n25A-n66A<br>CA_n25A-n77A<br>CA_n41A-n66A<br>CA_n41A-n77A<br>CA_n66A-n77A | n25 | 5, 10, 15, 20, 25, 30, 40                                          | 0       |
|                           |                                                                                              | n41 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100                        |         |
|                           |                                                                                              | n66 | 5, 10, 15, 20, 25, 30, 40                                          |         |
|                           |                                                                                              | n77 | CA_n77(2A)_BCS1                                                    |         |
|                           |                                                                                              | n25 | n25 channel bandwidths in Table 5.3.5-1                            | 4 and 5 |
|                           |                                                                                              | n41 | n41 channel bandwidths in Table 5.3.5-1                            |         |
|                           |                                                                                              | n66 | n66 channel bandwidths in Table 5.3.5-1                            |         |
|                           |                                                                                              | n77 | See CA_n77(2A) Bandwidth Combination Set 4 and 5 in Table 5.5A.2-1 |         |
| CA_n25A-n41A-n66A-n78A    | CA_n25A-n41A<br>CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n41A-n66A<br>CA_n41A-n78A<br>CA_n66A-n78A | n25 | 5, 10, 15, 20, 25, 30, 40                                          | 0       |
|                           |                                                                                              | n41 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100                        |         |
|                           |                                                                                              | n66 | 5, 10, 15, 20, 25, 30, 40                                          |         |
|                           |                                                                                              | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                    |         |
|                           |                                                                                              |     |                                                                    |         |

|                           |                                                                                                         |     |                                                                    |         |
|---------------------------|---------------------------------------------------------------------------------------------------------|-----|--------------------------------------------------------------------|---------|
| CA_n25A-n41A-n66A-n78(2A) | CA_n25A-n41A<br>CA_n25A-n66A<br>CA_n25A-n78A<br>CA_n41A-n66A<br>CA_n41A-n78A<br>CA_n66A-n78A            | n25 | 5, 10, 15, 20, 25, 30, 40                                          | 0       |
|                           |                                                                                                         | n41 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100                        |         |
|                           |                                                                                                         | n66 | 5, 10, 15, 20, 25, 30, 40                                          |         |
|                           |                                                                                                         | n78 | CA_n78(2A)_BCS2                                                    |         |
| CA_n25A-n41A-n71A-n77A    | CA_n25A-n41A<br>CA_n25A-n71A<br>CA_n25A-n77A<br>CA_n41A-n71A<br>CA_n41A-n77A<br>CA_n71A-n77A            | n25 | 5, 10, 15, 20, 25, 30, 40                                          | 0       |
|                           |                                                                                                         | n41 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100                        |         |
|                           |                                                                                                         | n71 | 5, 10, 15, 20                                                      |         |
|                           |                                                                                                         | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                    |         |
|                           |                                                                                                         | n25 | n25 channel bandwidths in Table 5.3.5-1                            | 4 and 5 |
|                           |                                                                                                         | n41 | n41 channel bandwidths in Table 5.3.5-1                            |         |
|                           |                                                                                                         | n71 | n71 channel bandwidths in Table 5.3.5-1                            |         |
|                           |                                                                                                         | n77 | n77 channel bandwidths in Table 5.3.5-1                            |         |
| CA_n25A-n41C-n71A-n77A    | CA_n25A-n41A<br>CA_n25A-n71A<br>CA_n25A-n77A<br>CA_n41A-n71A<br>CA_n41A-n77A<br>CA_n41C<br>CA_n71A-n77A | n25 | 5, 10, 15, 20, 25, 30, 40                                          | 0       |
|                           |                                                                                                         | n41 | CA_n41C_BCS1                                                       |         |
|                           |                                                                                                         | n71 | 5, 10, 15, 20                                                      |         |
|                           |                                                                                                         | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                    |         |
|                           |                                                                                                         | n25 | n25 channel bandwidths in Table 5.3.5-1                            | 4 and 5 |
|                           |                                                                                                         | n41 | See CA_n41C Bandwidth Combination Set 4 and 5 in Table 5.5A.1-1    |         |
|                           |                                                                                                         | n71 | n71 channel bandwidths in Table 5.3.5-1                            |         |
|                           |                                                                                                         | n77 | n77 channel bandwidths in Table 5.3.5-1                            |         |
| CA_n25A-n41(2A)-n71A-n77A | CA_n25A-n41A<br>CA_n25A-n71A<br>CA_n25A-n77A<br>CA_n41A-n71A<br>CA_n41A-n77A<br>CA_n71A-n77A            | n25 | 5, 10, 15, 20, 25, 30, 40                                          | 0       |
|                           |                                                                                                         | n41 | CA_n41(2A)_BCS1                                                    |         |
|                           |                                                                                                         | n71 | 5, 10, 15, 20                                                      |         |
|                           |                                                                                                         | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                    |         |
|                           |                                                                                                         | n25 | n25 channel bandwidths in Table 5.3.5-1                            | 4 and 5 |
|                           |                                                                                                         | n41 | See CA_n41(2A) Bandwidth Combination Set 4 and 5 in Table 5.5A.1-2 |         |
|                           |                                                                                                         | n71 | n71 channel bandwidths in Table 5.3.5-1                            |         |

|                              |                                                                                              |     |                                                 |         |
|------------------------------|----------------------------------------------------------------------------------------------|-----|-------------------------------------------------|---------|
|                              |                                                                                              | n77 | n77 channel bandwidths in Table 5.3.5-1         |         |
| CA_n25A-n41A-n71A-n78A       | -                                                                                            | n25 | 5, 10, 15, 20, 25, 30, 40                       | 0       |
|                              |                                                                                              | n41 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100     |         |
|                              |                                                                                              | n71 | 5, 10, 15, 20                                   |         |
|                              |                                                                                              | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |         |
| CA_n25A-n66A-n71A-n77A       | CA_n25A-n66A<br>CA_n25A-n71A<br>CA_n25A-n77A<br>CA_n66A-n71A<br>CA_n66A-n77A<br>CA_n71A-n77A | n25 | 5, 10, 15, 20, 25, 30, 40                       | 0       |
|                              |                                                                                              | n66 | 5, 10, 15, 20, 25, 30, 40                       |         |
|                              |                                                                                              | n71 | 5, 10, 15, 20                                   |         |
|                              |                                                                                              | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |         |
|                              |                                                                                              | n25 | n25 channel bandwidths in Table 5.3.5-1         | 4 and 5 |
|                              |                                                                                              | n66 | n66 channel bandwidths in Table 5.3.5-1         |         |
|                              |                                                                                              | n71 | n71 channel bandwidths in Table 5.3.5-1         |         |
|                              |                                                                                              | n77 | n77 channel bandwidths in Table 5.3.5-1         |         |
| CA_n25A-n66A-n71A-n78A       | CA_n25A-n66A<br>CA_n25A-n71A<br>CA_n25A-n78A<br>CA_n66A-n71A<br>CA_n66A-n78A<br>CA_n71A-n78A | n25 | 5, 10, 15, 20, 25, 30, 40                       | 0       |
|                              |                                                                                              | n66 | 5, 10, 15, 20, 25, 30, 40                       |         |
|                              |                                                                                              | n71 | 5, 10, 15, 20                                   |         |
|                              |                                                                                              | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |         |
| CA_n25A-n66(2A)-n71A-n78A    | CA_n25A-n66A<br>CA_n25A-n71A<br>CA_n25A-n78A<br>CA_n66A-n71A<br>CA_n66A-n78A<br>CA_n71A-n78A | n25 | 5, 10, 15, 20, 25, 30, 40                       | 0       |
|                              |                                                                                              | n66 | CA_n66(2A) BCS1                                 |         |
|                              |                                                                                              | n71 | 5, 10, 15, 20                                   |         |
|                              |                                                                                              | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |         |
| CA_n25A-n66A-n71A-n78(2A)    | CA_n25A-n66A<br>CA_n25A-n71A<br>CA_n25A-n78A<br>CA_n66A-n71A<br>CA_n66A-n78A<br>CA_n71A-n78A | n25 | 5, 10, 15, 20, 25, 30, 40                       | 0       |
|                              |                                                                                              | n66 | 5, 10, 15, 20, 25, 30, 40                       |         |
|                              |                                                                                              | n71 | 5, 10, 15, 20                                   |         |
|                              |                                                                                              | n78 | CA_n78(2A) BCS2                                 |         |
| CA_n25A-n66(2A)-n71A-n78(2A) | CA_n25A-n66A<br>CA_n25A-n71A<br>CA_n25A-n78A<br>CA_n66A-n71A<br>CA_n66A-n78A<br>CA_n71A-n78A | n25 | 5, 10, 15, 20, 25, 30, 40                       | 0       |
|                              |                                                                                              | n66 | CA_n66(2A) BCS1                                 |         |
|                              |                                                                                              | n71 | 5, 10, 15, 20                                   |         |
|                              |                                                                                              | n78 | CA_n78(2A) BCS2                                 |         |
| CA_n29A-n30A-n66A-n77A       | CA_n30A-n66A<br>CA_n30A-n77A                                                                 | n29 | 5, 10                                           | 0       |



|                           |                                                                                                         |     |                                                                    |         |
|---------------------------|---------------------------------------------------------------------------------------------------------|-----|--------------------------------------------------------------------|---------|
|                           | CA_n66A-n77A                                                                                            |     |                                                                    |         |
|                           |                                                                                                         | n30 | 5, 10                                                              |         |
|                           |                                                                                                         | n66 | 5, 10, 15, 20, 25, 30, 40                                          |         |
|                           |                                                                                                         | n77 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100                        |         |
| CA_n41A-n66A-n70A-n78A    | CA_n41A-n66A<br>CA_n41A-n70A<br>CA_n41A-n78A<br>CA_n66A-n78A<br>CA_n70A-n78A                            | n41 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100                        | 0       |
|                           |                                                                                                         | n66 | 10, 15, 20, 25, 30, 40                                             |         |
|                           |                                                                                                         | n70 | 5, 10, 15, 20, 25                                                  |         |
|                           |                                                                                                         | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                    |         |
| CA_n41A-n66A-n71A-n77A    | CA_n41A-n66A<br>CA_n41A-n71A<br>CA_n41A-n77A<br>CA_n66A-n71A<br>CA_n66A-n77A<br>CA_n71A-n77A            | n41 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100                        | 0       |
|                           |                                                                                                         | n66 | 5, 10, 15, 20, 25, 30, 40                                          |         |
|                           |                                                                                                         | n71 | 5, 10, 15, 20                                                      |         |
|                           |                                                                                                         | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                    |         |
|                           |                                                                                                         | n41 | n41 channel bandwidths in Table 5.3.5-1                            | 4 and 5 |
|                           |                                                                                                         | n66 | n66 channel bandwidths in Table 5.3.5-1                            |         |
|                           |                                                                                                         | n71 | n71 channel bandwidths in Table 5.3.5-1                            |         |
|                           |                                                                                                         | n77 | n77 channel bandwidths in Table 5.3.5-1                            |         |
| CA_n41C-n66A-n71A-n77A    | CA_n41A-n66A<br>CA_n41A-n71A<br>CA_n41A-n77A<br>CA_n41C<br>CA_n66A-n71A<br>CA_n66A-n77A<br>CA_n71A-n77A | n41 | CA_n41C_BCS1                                                       | 0       |
|                           |                                                                                                         | n66 | 5, 10, 15, 20, 25, 30, 40                                          |         |
|                           |                                                                                                         | n71 | 5, 10, 15, 20                                                      |         |
|                           |                                                                                                         | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                    |         |
|                           |                                                                                                         | n41 | See CA_n41C Bandwidth Combination Set 4 and 5 in Table 5.5A.1-1    | 4 and 5 |
|                           |                                                                                                         | n66 | n66 channel bandwidths in Table 5.3.5-1                            |         |
|                           |                                                                                                         | n71 | n71 channel bandwidths in Table 5.3.5-1                            |         |
|                           |                                                                                                         | n77 | n77 channel bandwidths in Table 5.3.5-1                            |         |
| CA_n41(2A)-n66A-n71A-n77A | CA_n41A-n66A<br>CA_n41A-n71A<br>CA_n41A-n77A<br>CA_n66A-n71A<br>CA_n66A-n77A<br>CA_n71A-n77A            | n41 | CA_n41(2A)_BCS1                                                    | 0       |
|                           |                                                                                                         | n66 | 5, 10, 15, 20, 25, 30, 40                                          |         |
|                           |                                                                                                         | n71 | 5, 10, 15, 20                                                      |         |
|                           |                                                                                                         | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                    |         |
|                           |                                                                                                         | n41 | See CA_n41(2A) Bandwidth Combination Set 4 and 5 in Table 5.5A.2-1 | 4 and 5 |

|                              |                                                                                              |     |                                                                    |         |
|------------------------------|----------------------------------------------------------------------------------------------|-----|--------------------------------------------------------------------|---------|
|                              |                                                                                              | n66 | n66 channel bandwidths in Table 5.3.5-1                            |         |
|                              |                                                                                              | n71 | n71 channel bandwidths in Table 5.3.5-1                            |         |
|                              |                                                                                              | n77 | n77 channel bandwidths in Table 5.3.5-1                            |         |
| CA_n41A-n66(2A)-n71A-n77A    | CA_n41A-n66A<br>CA_n41A-n71A<br>CA_n41A-n77A<br>CA_n66A-n71A<br>CA_n66A-n77A<br>CA_n71A-n77A | n41 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100                        | 0       |
|                              |                                                                                              | n66 | CA_n66(2A)_BCS1                                                    |         |
|                              |                                                                                              | n71 | 5, 10, 15, 20                                                      |         |
|                              |                                                                                              | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                    | 4 and 5 |
|                              |                                                                                              | n41 | n41 channel bandwidths in Table 5.3.5-1                            |         |
|                              |                                                                                              | n66 | See CA_n66(2A) Bandwidth Combination Set 4 and 5 in Table 5.5A.2-1 |         |
|                              |                                                                                              | n71 | n71 channel bandwidths in Table 5.3.5-1                            |         |
|                              |                                                                                              | n77 | n77 channel bandwidths in Table 5.3.5-1                            |         |
| CA_n41A-n66A-n71A-n77(2A)    | CA_n41A-n66A<br>CA_n41A-n71A<br>CA_n41A-n77A<br>CA_n66A-n71A<br>CA_n66A-n77A<br>CA_n71A-n77A | n41 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100                        | 0       |
|                              |                                                                                              | n66 | 5, 10, 15, 20, 25, 30, 40                                          |         |
|                              |                                                                                              | n71 | 5, 10, 15, 20                                                      |         |
|                              |                                                                                              | n77 | CA_n77(2A)_BCS1                                                    | 4 and 5 |
|                              |                                                                                              | n41 | n41 channel bandwidths in Table 5.3.5-1                            |         |
|                              |                                                                                              | n66 | n66 channel bandwidths in Table 5.3.5-1                            |         |
|                              |                                                                                              | n71 | n71 channel bandwidths in Table 5.3.5-1                            |         |
|                              |                                                                                              | n77 | See CA_n77(2A) Bandwidth Combination Set 4 and 5 in Table 5.5A.2-1 |         |
| CA_n41A-n66(2A)-n71A-n77(2A) | CA_n41A-n66A<br>CA_n41A-n71A<br>CA_n41A-n77A<br>CA_n66A-n71A<br>CA_n66A-n77A<br>CA_n71A-n77A | n41 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100                        | 0       |
|                              |                                                                                              | n66 | CA_n66(2A)_BCS1                                                    |         |
|                              |                                                                                              | n71 | 5, 10, 15, 20                                                      |         |
|                              |                                                                                              | n77 | CA_n77(2A)_BCS1                                                    |         |
| CA_n41A-n66A-n71A-n78A       | CA_n41A-n66A<br>CA_n41A-n71A<br>CA_n41A-n78A<br>CA_n66A-n71A<br>CA_n66A-n78A<br>CA_n71A-n78A | n41 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100                        | 0       |
|                              |                                                                                              | n66 | 5, 10, 15, 20, 25, 30, 40                                          |         |
|                              |                                                                                              | n71 | 5, 10, 15, 20                                                      |         |
|                              |                                                                                              | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                    |         |
| CA_n41A-n66(2A)-n71A-n78A    | CA_n41A-n66A<br>CA_n41A-n71A                                                                 | n41 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100                        | 0       |

|                                                                                                                                                                                                                                                                                                                 |                                                                                              |     |                                                 |   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|-----|-------------------------------------------------|---|
|                                                                                                                                                                                                                                                                                                                 | CA_n41A-n78A<br>CA_n66A-n71A<br>CA_n66A-n78A<br>CA_n71A-n78A                                 |     |                                                 |   |
|                                                                                                                                                                                                                                                                                                                 |                                                                                              | n66 | CA_n66(2A)_BCS1                                 |   |
|                                                                                                                                                                                                                                                                                                                 |                                                                                              | n71 | 5, 10, 15, 20                                   |   |
|                                                                                                                                                                                                                                                                                                                 |                                                                                              | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |   |
| CA_n41A-n66A-n71A-n78(2A)                                                                                                                                                                                                                                                                                       | CA_n41A-n66A<br>CA_n41A-n71A<br>CA_n41A-n78A<br>CA_n66A-n71A<br>CA_n66A-n78A<br>CA_n71A-n78A | n41 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100     | 0 |
|                                                                                                                                                                                                                                                                                                                 |                                                                                              | n66 | 5, 10, 15, 20, 25, 30, 40                       |   |
|                                                                                                                                                                                                                                                                                                                 |                                                                                              | n71 | 5, 10, 15, 20                                   |   |
|                                                                                                                                                                                                                                                                                                                 |                                                                                              | n78 | CA_n78(2A)_BCS2                                 |   |
| CA_n41A-n66(2A)-n71A-n78(2A)                                                                                                                                                                                                                                                                                    | CA_n41A-n66A<br>CA_n41A-n71A<br>CA_n41A-n78A<br>CA_n66A-n71A<br>CA_n66A-n78A<br>CA_n71A-n78A | n41 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100     | 0 |
|                                                                                                                                                                                                                                                                                                                 |                                                                                              | n66 | CA_n66(2A)_BCS1                                 |   |
|                                                                                                                                                                                                                                                                                                                 |                                                                                              | n71 | 5, 10, 15, 20                                   |   |
|                                                                                                                                                                                                                                                                                                                 |                                                                                              | n78 | CA_n78(2A)_BCS2                                 |   |
| NOTE 1: This UE channel bandwidth is optional in this release of the specification.                                                                                                                                                                                                                             |                                                                                              |     |                                                 |   |
| NOTE 2: For the 20 MHz bandwidth, the minimum requirements are specified for NR UL carrier frequencies confined to either 713-723 MHz or 728-738 MHz. For the 30MHz bandwidth, the minimum requirements are specified for NR UL transmission bandwidth configuration confined to either 703-733 or 718-748 MHz. |                                                                                              |     |                                                 |   |
| NOTE 3: For each channel bandwidth of each component carrier, refer to Table 5.3.5-1 for the applicable SCSSs. For a given band, not all UE channel bandwidths support the same SCSSs..                                                                                                                         |                                                                                              |     |                                                 |   |
| NOTE 4: Only single uplink carriers with power class other than PC3 are listed.                                                                                                                                                                                                                                 |                                                                                              |     |                                                 |   |
| NOTE 5: Minimum requirements for Power Class 2 are applicable for this uplink combination or single uplink carrier in this downlink/uplink combination.                                                                                                                                                         |                                                                                              |     |                                                 |   |
| NOTE 6: For this bandwidth, the minimum requirements are restricted to operation when carrier is configured as a downlink SCell part of CA configuration                                                                                                                                                        |                                                                                              |     |                                                 |   |

### 5.5A.3.4 Configurations for inter-band CA (five bands)

**Table 5.5A.3.4-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (five bands)**

| NR CA configuration     | Uplink configuration                                                                                                                         | NR Band | Channel bandwidth (MHz) (NOTE 1)                | Bandwidth combination set |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|---------|-------------------------------------------------|---------------------------|
| CA_n1A-n3A-n5A-n7A-n78A | CA_n1A-n3A<br>CA_n1A-n5A<br>CA_n1A-n7A<br>CA_n1A-n78A<br>CA_n3A-n5A<br>CA_n3A-n7A<br>CA_n3A-n78A<br>CA_n5A-n7A<br>CA_n5A-n78A<br>CA_n7A-n78A | n1      | 5, 10, 15, 20                                   | 0                         |
|                         |                                                                                                                                              | n3      | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                         |                                                                                                                                              | n5      | 5, 10, 15, 20                                   |                           |
|                         |                                                                                                                                              | n7      | 5, 10, 15, 20, 25, 30, 40, 50                   |                           |
|                         |                                                                                                                                              | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n1A-n3A-n5A-n7B-n78A | CA_n1A-n3A<br>CA_n1A-n5A<br>CA_n1A-n7A<br>CA_n1A-n78A<br>CA_n3A-n5A<br>CA_n3A-n7A                                                            | n1      | 5, 10, 15, 20                                   | 0                         |
|                         |                                                                                                                                              | n3      | 5, 10, 15, 20, 25, 30, 40                       |                           |
|                         |                                                                                                                                              | n5      | 5, 10, 15, 20                                   |                           |

| NR CA configuration         | Uplink configuration                                                                                                                                       | NR Band | Channel bandwidth (MHz) (NOTE 1)                                                                                              | Bandwidth combination set |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------------------------------------------------------------------------------------------------------------------------------|---------------------------|
|                             | CA_n3A-n78A<br>CA_n5A-n7A<br>CA_n5A-n78A<br>CA_n7A-n78A<br>CA_n7B                                                                                          | n7      | See CA_n7B bandwidth combination set 0 in Table 5.5A.1-1                                                                      |                           |
|                             |                                                                                                                                                            | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                               |                           |
| CA_n1A-n3A-n7A-n28A-n78A    | -                                                                                                                                                          | n1      | 5, 10, 15, 20, 25, 30, 40, 50                                                                                                 | 0                         |
|                             |                                                                                                                                                            | n3      | 5, 10, 15, 20, 25, 30, 40                                                                                                     |                           |
|                             |                                                                                                                                                            | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                                                                                 |                           |
|                             |                                                                                                                                                            | n28     | 5, 10, 15, 20, 30                                                                                                             |                           |
|                             |                                                                                                                                                            | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                               |                           |
|                             | CA_n1A-n3A<br>CA_n1A-n7A<br>CA_n1A-n28A<br>CA_n1A-n78A<br>CA_n3A-n7A<br>CA_n3A-n28A<br>CA_n3A-n78A<br>CA_n7A-n28A<br>CA_n7A-n78A<br>CA_n28A-n78A           | n1      | 5, 10, 15, 20                                                                                                                 | 1                         |
|                             |                                                                                                                                                            | n3      | 5, 10, 15, 20, 25, 30, 40                                                                                                     |                           |
|                             |                                                                                                                                                            | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                                                                                 |                           |
|                             |                                                                                                                                                            | n28     | 5, 10, 15, 20                                                                                                                 |                           |
|                             |                                                                                                                                                            | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                               |                           |
| CA_n1A-n3A-n7B-n28A-n78A    | CA_n1A-n3A<br>CA_n1A-n7A<br>CA_n1A-n28A<br>CA_n1A-n78A<br>CA_n3A-n7A<br>CA_n3A-n28A<br>CA_n3A-n78A<br>CA_n7A-n28A<br>CA_n7A-n78A<br>CA_n7B<br>CA_n28A-n78A | n1      | 5, 10, 15, 20, 25, 30, 40, 50                                                                                                 | 0                         |
|                             |                                                                                                                                                            | n3      | 5, 10, 15, 20, 25, 30, 40                                                                                                     |                           |
|                             |                                                                                                                                                            | n7      | See CA_n7B bandwidth combination set 0 in Table 5.5A.1-1                                                                      |                           |
|                             |                                                                                                                                                            | n28     | 5, 10, 15, 20, 30                                                                                                             |                           |
|                             |                                                                                                                                                            | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                               |                           |
| CA_n1A-n3A-n7A-n28A-n78(2A) | CA_n1A-n3A<br>CA_n1A-n7A<br>CA_n1A-n28A<br>CA_n1A-n78A<br>CA_n3A-n7A<br>CA_n3A-n28A<br>CA_n3A-n78A<br>CA_n7A-n28A<br>CA_n7A-n78A<br>CA_n28A-n78A           | n1      | 5, 10, 15, 20, 25, 30, 40, 50                                                                                                 | 0                         |
|                             |                                                                                                                                                            | n3      | 5, 10, 15, 20, 25, 30, 40, 50                                                                                                 |                           |
|                             |                                                                                                                                                            | n7      | 5, 10, 15, 20, 25, 30, 40, 50                                                                                                 |                           |
|                             |                                                                                                                                                            | n28     | 5, 10, 15, 20, 30                                                                                                             |                           |
|                             |                                                                                                                                                            | n78     | See CA_n78(2A) Bandwidth Combination Set 2 in Table 5.5A.2-1                                                                  |                           |
| CA_n2A-n5A-n48A-n66A-n77A   | CA_n2A-n5A<br>CA_n2A-n48A<br>CA_n2A-n66A<br>CA_n2A-n77A<br>CA_n5A-n48A<br>CA_n5A-n66A<br>CA_n5A-n77A<br>CA_n48A-n66A<br>CA_n66A-n77A                       | n2      | 5, 10, 15, 20                                                                                                                 | 0                         |
|                             |                                                                                                                                                            | n5      | 5, 10, 15, 20                                                                                                                 |                           |
|                             |                                                                                                                                                            | n48     | 5, 10, 15, 20, 40, 50 <sup>2</sup> , 60 <sup>2</sup> , 70 <sup>2</sup> , 80 <sup>2</sup> , 90 <sup>2</sup> , 100 <sup>2</sup> |                           |

| NR CA configuration                                                                                                                                                                                                                                          | Uplink configuration                                                                                                                            | NR Band | Channel bandwidth (MHz) (NOTE 1)                                                                                              | Bandwidth combination set |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------------------------------------------------------------------------------------------------------------------------------|---------------------------|
|                                                                                                                                                                                                                                                              |                                                                                                                                                 | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                     |                           |
|                                                                                                                                                                                                                                                              |                                                                                                                                                 | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                               |                           |
| CA_n2A-n5A-n48B-n66A-n77A                                                                                                                                                                                                                                    | CA_n2A-n5A<br>CA_n2A-n48A<br>CA_n2A-n66A<br>CA_n2A-n77A<br>CA_n5A-n48A<br>CA_n5A-n66A<br>CA_n5A-n77A<br>CA_n48A-n66A<br>CA_n48B<br>CA_n66A-n77A | n2      | 5, 10, 15, 20                                                                                                                 | 0                         |
|                                                                                                                                                                                                                                                              |                                                                                                                                                 | n5      | 5, 10, 15, 20                                                                                                                 |                           |
|                                                                                                                                                                                                                                                              |                                                                                                                                                 | n48     | See CA_n48B Bandwidth Combination Set 2 in Table 5.5A.1-1                                                                     |                           |
|                                                                                                                                                                                                                                                              |                                                                                                                                                 | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                     |                           |
|                                                                                                                                                                                                                                                              |                                                                                                                                                 | n77     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                               |                           |
|                                                                                                                                                                                                                                                              |                                                                                                                                                 |         |                                                                                                                               |                           |
| CA_n2A-n5A-n48A-n66A-n77C                                                                                                                                                                                                                                    | CA_n2A-n5A<br>CA_n2A-n48A<br>CA_n2A-n66A<br>CA_n2A-n77A<br>CA_n5A-n48A<br>CA_n5A-n66A<br>CA_n5A-n77A<br>CA_n48A-n66A<br>CA_n66A-n77A<br>CA_n77C | n2      | 5, 10, 15, 20                                                                                                                 | 0                         |
|                                                                                                                                                                                                                                                              |                                                                                                                                                 | n5      | 5, 10, 15, 20                                                                                                                 |                           |
|                                                                                                                                                                                                                                                              |                                                                                                                                                 | n48     | 5, 10, 15, 20, 40, 50 <sup>2</sup> , 60 <sup>2</sup> , 70 <sup>2</sup> , 80 <sup>2</sup> , 90 <sup>2</sup> , 100 <sup>2</sup> |                           |
|                                                                                                                                                                                                                                                              |                                                                                                                                                 | n66     | 5, 10, 15, 20, 25, 30, 40                                                                                                     |                           |
|                                                                                                                                                                                                                                                              |                                                                                                                                                 | n77     | See CA_n77C Bandwidth Combination Set 1 in Table 5.5A.1-1                                                                     |                           |
|                                                                                                                                                                                                                                                              |                                                                                                                                                 |         |                                                                                                                               |                           |
| NOTE 1: For each channel bandwidth of each component carrier, refer to Table 5.3.5-1 of TS 38.101-1 and TS 38.101-2 for the applicable SCSs for NR FR1 and NR FR2 bands respectively. For a given band, not all UE channel bandwidths support the same SCSs. |                                                                                                                                                 |         |                                                                                                                               |                           |
| NOTE 2: For this bandwidth, the minimum requirements are restricted to operation when carrier is configured as a downlink SCell part of CA configuration                                                                                                     |                                                                                                                                                 |         |                                                                                                                               |                           |

## 5.5B Configurations for DC

For an NR DC configuration specified in Table 5.5B-1, the bandwidth combination sets for the corresponding NR CA configuration in 5.5A.3, i.e., dual uplink inter-band carrier aggregation with uplink assigned to two NR bands, are applicable to Dual Connectivity.

**Table 5.5B-1: Inter-band NR DC configurations (two bands)**

| NR DC configuration         | Uplink NR DC configuration |
|-----------------------------|----------------------------|
| DC_n1A-n3A                  | DC_n1A-n3A                 |
| DC_n1A-n7A                  | DC_n1A-n7A                 |
| DC_n1A-n28A                 | DC_n1A-n28A                |
| DC_n1A-n41A                 | DC_n1A-n41A                |
| DC_n1A-n77A <sup>2</sup>    | DC_n1A-n77A                |
| DC_n1A-n78A                 | DC_n1A-n78A                |
| DC_n1A-n79A <sup>2</sup>    | DC_n1A-n79A                |
| DC_n2A-n5A                  | DC_n2A-n5A                 |
| DC_n2A-n5B                  |                            |
| DC_n2A-n48A                 | DC_n2A-n48A                |
| DC_n2A-n48B                 |                            |
| DC_n2A-n48C                 |                            |
| DC_n2A-n48(2A)              | DC_n2A-n48A                |
| DC_n2A-n66A                 | DC_n2A-n66A                |
| DC_n2A-n66B                 |                            |
| DC_n2A-n77A                 | DC_n2A-n77A                |
| DC_n2A-n77C                 |                            |
| DC_n2A-n77(2A)              | DC_n2A-n77A                |
| DC_n2(2A)-n77A              |                            |
| DC_n2(2A)-n77C              |                            |
| DC_n3A-n28A                 | DC_n3A-n28A                |
| DC_n3A-n41A                 | DC_n3A-n41A                |
| DC_n3A-n77A <sup>2</sup>    | DC_n3A-n77A                |
| DC_n3A-n77(2A) <sup>2</sup> | DC_n3A-n77A                |
| DC_n3A-n78A <sup>2</sup>    | DC_n3A-n78A                |
| DC_n3A-n79A                 | DC_n3A-n79A                |
| DC_n5A-n48A                 | DC_n5A-n48A                |
| DC_n5A-n48B                 |                            |
| DC_n5A-n48C                 |                            |
| DC_n5A-n48(2A)              | DC_n5A-n48A                |
| DC_n5A-n66A                 | DC_n5A-n66A                |
| DC_n5B-n66A                 |                            |
| DC_n5A-n66(2A)              | DC_n5A-n66A                |
| DC_n5B-n66(2A)              |                            |
| DC_n5A-n77A                 | DC_n5A-n77A                |
| DC_n5A-n77C                 |                            |
| DC_n5A-n77(2A)              | DC_n5A-n77A                |
| DC_n5(2A)-n77A              |                            |
| DC_n5(2A)-n77C              |                            |
| DC_n7A-n46A                 | DC_n7A-n46A                |
| DC_n7A-n46C                 |                            |
| DC_n7A-n46D                 |                            |
| DC_n7A-n78A                 | DC_n7A-n78A                |
| DC_n12A-n77A                | DC_n12A-n77A               |
| DC_n12A-n77(2A)             | DC_n12A-n77A               |
| DC_n28A-n41A                | DC_n28A-n41A               |
| DC_n28A-n46A                |                            |
| DC_n28A-n46C                | DC_n28A-n46A               |
| DC_n28A-n46D                |                            |
| DC_n28A-n77A <sup>2</sup>   | DC_n28A-n77A               |
| DC_n28A-n77(2A)             | DC_n28A-n77A               |
| DC_n28A-n78A <sup>2</sup>   | DC_n28A-n78A               |
| DC_n28A-n79A                | DC_n28A-n79A               |

| NR DC configuration                                                                                                                                                                                                                          | Uplink NR DC configuration   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| DC_n41A-n77A                                                                                                                                                                                                                                 | DC_n41A-n77A                 |
| DC_n41A-n78A                                                                                                                                                                                                                                 | DC_n41A-n78A                 |
| DC_n46A-n48A<br>DC_n46A-n48B<br>DC_n46A-n48C<br>DC_n46B-n48A<br>DC_n46B-n48B<br>DC_n46B-n48C<br>DC_n46C-n48A<br>DC_n46C-n48B<br>DC_n46C-n48C<br>DC_n46D-n48A<br>DC_n46D-n48B<br>DC_n46D-n48C<br>DC_n46N-n48A<br>DC_n46N-n48B<br>DC_n46N-n48C | DC_n46A-n48A<br>DC_n46A-n48B |
| DC_n46A-n78A<br>DC_n46C-n78A<br>DC_n46D-n78A                                                                                                                                                                                                 | DC_n46A-n78A                 |
| DC_n48A-n66A<br>DC_n48B-n66A<br>DC_n48C-n66A                                                                                                                                                                                                 | DC_n48A-n66A                 |
| DC_n48A-n66(2A)<br>DC_n48B-n66(2A)<br>DC_n48(2A)-n66A<br>DC_n48(2A)-n66(2A)                                                                                                                                                                  | DC_n48A-n66A                 |
| DC_n48A-n70A<br>DC_n48B-n70A                                                                                                                                                                                                                 | DC_n48A-n70A                 |
| DC_n48(2A)-n70A                                                                                                                                                                                                                              | DC_n48A-n70A                 |
| DC_n48A-n71A<br>DC_n48B-n71A<br>DC_n48C-n71A                                                                                                                                                                                                 | DC_n48A-n71A                 |
| DC_n48A-n71(2A)<br>DC_n48(2A)-n71A<br>DC_n48(2A)-n71(2A)<br>DC_n48(3A)-n71A<br>DC_n48(4A)-n71A<br>DC_n48B-n71(2A)                                                                                                                            | DC_n48A-n71A                 |
| DC_n48A-n96A<br>DC_n48B-n96A<br>DC_n48C-n96A<br>DC_n48A-n96B<br>DC_n48B-n96B<br>DC_n48C-n96B<br>DC_n48A-n96C<br>DC_n48B-n96C<br>DC_n48C-n96C<br>DC_n48A-n96D<br>DC_n48B-n96D<br>DC_n48C-n96D<br>DC_n48A-n96E<br>DC_n48B-n96E<br>DC_n48C-n96E | DC_n48A-n96A<br>DC_n48B-n96A |
| DC_n66A-n77A<br>DC_n66A-n77C<br>DC_n66B-n77A<br>DC_n66B-n77C                                                                                                                                                                                 | DC_n66A-n77A                 |
| DC_n66A-n77(2A)                                                                                                                                                                                                                              | DC_n66A-n77A                 |
| DC_n66(2A)-n77(2A)<br>DC_n66(2A)-n77C                                                                                                                                                                                                        | DC_n66A-n77A                 |
| DC_n71A-n77A                                                                                                                                                                                                                                 | DC_n71A-n77A                 |
| DC_n71A-n77(2A)                                                                                                                                                                                                                              | DC_n71A-n77A                 |
| DC_n77A-n79A <sup>1</sup>                                                                                                                                                                                                                    | DC_n77A-n79A                 |
| DC_n77(2A)-n79A <sup>1</sup>                                                                                                                                                                                                                 | DC_n77A-n79A                 |

| NR DC configuration                                                                                                                                                                                                                                   | Uplink NR DC configuration |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| NOTE 1: The minimum requirements apply only when there is non-simultaneous Rx/Tx operation between n77-n79 NR carriers. This restriction applies also for these carriers when applicable NR DC configuration is part of a higher order configuration. |                            |
| NOTE 2: Applicable for UE supporting inter-band NR DC with mandatory simultaneous Rx/Tx capability.                                                                                                                                                   |                            |

Table 5.5B-2: Inter-band NR DC configurations (three bands)

| NR DC configuration | Uplink NR DC configuration                 |
|---------------------|--------------------------------------------|
| DC_n1A-n3A-n28A     | DC_n1A-n3A<br>DC_n1A-n28A<br>DC_n3A-n28A   |
| DC_n1A-n3A-n41A     | DC_n1A-n3A<br>DC_n1A-n41A<br>DC_n3A-n41A   |
| DC_n1A-n3A-n77A     | DC_n1A-n3A<br>DC_n3A-n77A<br>DC_n1A-n77A   |
| DC_n1A-n3A-n78A     | DC_n1A-n3A<br>DC_n3A-n78A<br>DC_n1A-n78A   |
| DC_n1A-n3A-n79A     | DC_n1A-n3A<br>DC_n3A-n79A<br>DC_n1A-n79A   |
| DC_n1A-n7A-n78A     | DC_n1A-n7A<br>DC_n7A-n78A<br>DC_n1A-n78A   |
| DC_n1A-n28A-n41A    | DC_n1A-n28A<br>DC_n1A-n41A<br>DC_n28A-n41A |
| DC_n1A-n28A-n77A    | DC_n1A-n28A<br>DC_n1A-n77A<br>DC_n28A-n77A |
| DC_n1A-n28A-n78A    | DC_n1A-n28A<br>DC_n1A-n78A<br>DC_n28A-n78A |
| DC_n1A-n28A-n79A    | DC_n1A-n28A<br>DC_n1A-n79A<br>DC_n28A-n79A |
| DC_n1A-n41A-n77A    | DC_n1A-n41A<br>DC_n1A-n77A<br>DC_n41A-n77A |
| DC_n1A-n77A-n79A    | DC_n1A-n77A<br>DC_n1A-n79A<br>DC_n77A-n79A |
| DC_n3A-n28A-n41A    | DC_n3A-n28A<br>DC_n3A-n41A<br>DC_n28A-n41A |
| DC_n3A-n28A-n77A    | DC_n3A-n28A<br>DC_n3A-n77A<br>DC_n28A-n77A |
| DC_n3A-n28A-n77(2A) | DC_n3A-n28A<br>DC_n3A-n77A<br>DC_n28A-n77A |
| DC_n3A-n28A-n78A    | DC_n3A-n28A<br>DC_n3A-n78A<br>DC_n28A-n78A |
| DC_n3A-n28A-n79A    | DC_n3A-n28A<br>DC_n3A-n79A<br>DC_n28A-n79A |
| DC_n3A-n41A-n77A    | DC_n3A-n41A                                |



| NR DC configuration                                         | Uplink NR DC configuration                   |
|-------------------------------------------------------------|----------------------------------------------|
|                                                             | DC_n3A-n77A<br>DC_n41A-n77A                  |
| DC_n28A-n41A-n77A                                           | DC_n28A-n41A<br>DC_n28A-n77A<br>DC_n41A-n77A |
| DC_n3A-n77A-n79A                                            | DC_n3A-n77A<br>DC_n3A-n79A<br>DC_n77A-n79A   |
| DC_n3A-n77(2A)-n79A                                         | DC_n3A-n77A<br>DC_n3A-n79A<br>DC_n77A-n79A   |
| DC_n7A-n46A-n78A                                            | DC_n7A-n46A<br>DC_n7A-n78A<br>DC_n46A-n78A   |
| DC_n7A-n46C-n78A                                            | DC_n7A-n46A<br>DC_n7A-n78A<br>DC_n46A-n78A   |
| DC_n7A-n46D-n78A                                            | DC_n7A-n46A<br>DC_n7A-n78A<br>DC_n46A-n78A   |
| DC_n28A-n46A-n78A<br>DC_n28A-n46C-n78A<br>DC_n28A-n46D-n78A | DC_n28A-n46A<br>DC_n28A-n78A<br>DC_n46A-n78A |
| DC_n28A-n77A-n79A                                           | DC_n28A-n77A<br>DC_n28A-n79A<br>DC_n77A-n79A |
| DC_n28A-n77(2A)-n79A                                        | DC_n28A-n77A<br>DC_n28A-n79A<br>DC_n77A-n79A |

Table 5.5B-3: Inter-band NR DC configurations (four bands)

| NR DC configuration   | Uplink NR DC configuration                                                                |
|-----------------------|-------------------------------------------------------------------------------------------|
| DC_n1A-n3A-n28A-n77A  | DC_n1A-n3A<br>DC_n1A-n28A<br>DC_n1A-n77A<br>DC_n3A-n28A<br>DC_n3A-n77A<br>DC_n28A-n77A    |
| DC_n1A-n3A-n28A-n79A  | DC_n1A-n3A<br>DC_n1A-n28A<br>DC_n1A-n79A<br>DC_n3A-n28A<br>DC_n3A-n79A<br>DC_n28A-n79A    |
| DC_n1A-n3A-n77A-n79A  | DC_n1A-n3A<br>DC_n1A-n77A<br>DC_n1A-n79A<br>DC_n3A-n77A<br>DC_n3A-n79A<br>DC_n77A-n79A    |
| DC_n1A-n28A-n77A-n79A | DC_n1A-n28A<br>DC_n1A-n77A<br>DC_n1A-n79A<br>DC_n28A-n77A<br>DC_n28A-n79A<br>DC_n77A-n79A |
| DC_n3A-n28A-n41A-n77A | DC_n3A-n28A<br>DC_n3A-n41A<br>DC_n3A-n77A<br>DC_n28A-n41A<br>DC_n28A-n77A<br>DC_n41A-n77A |

| NR DC configuration      | Uplink NR DC configuration                                                                |
|--------------------------|-------------------------------------------------------------------------------------------|
| DC_n3A-n28A-n77A-n79A    | DC_n3A-n28A<br>DC_n3A-n77A<br>DC_n3A-n79A<br>DC_n28A-n77A<br>DC_n28A-n79A<br>DC_n77A-n79A |
| DC_n3A-n28A-n77(2A)-n79A | DC_n3A-n28A<br>DC_n3A-n77A<br>DC_n3A-n79A<br>DC_n28A-n77A<br>DC_n28A-n79A<br>DC_n77A-n79A |

## 5.5C Configurations for SUL

The configuration tables for SUL describe Bandwidth Combination Sets. Bandwidth Combination Set 4 and 5 contains all possible defined channel bandwidths for each band in the combination. The fact that BCS4 and BCS5 contains all channel bandwidths for each band does not alter if a bandwidth is mandatory or optional for a given band. Bandwidths that are identified as optional in Table 5.3.5-1 for a given release are still optional for UEs that support BCS4 or BCS5. , where the bandwidths the UE supports for each band, the maximum bandwidth and/or minimum bandwidth for the band in the band combination are indicated in the UE capabilities. The minimum bandwidth per CC and aggregated FDD, TDD and total bandwidth per band combination may be indicated only for BCS5 as described in 38.306 [15] and BCS5 shall not be indicated together with BCS4 for a SUL configuration. For SUL band combinations including FR1 intra-band CA and with BCS4 or BCS5, the Bandwidth Combination Sets for the FR1 intra-band CA are BCS4 or BCS5.

**Table 5.5C-1: Supported channel bandwidths per SUL band combination**

| SUL configuration | NR Band | Channel bandwidth (MHz) (NOTE 1)                   | Bandwidth combination set |
|-------------------|---------|----------------------------------------------------|---------------------------|
| SUL_n24A-n99A     | n24     | 5, 10                                              | 0                         |
|                   | n99     | 5, 10                                              |                           |
| SUL_n41A-n80A     | n41     | 10, 15, 20, 40, 50, 60, 80, 90, 100                | 0                         |
|                   | n80     | 5, 10, 15, 20, 25, 30                              |                           |
|                   | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100            | 1                         |
|                   | n80     | 5, 10, 15, 20, 25, 30, 40                          |                           |
| SUL_n41A-n81A     | n41     | 10, 15, 20, 40, 50, 60, 80, 90, 100                | 0                         |
|                   | n81     | 5, 10, 15, 20                                      |                           |
| SUL_n41A-n83A     | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100            | 0                         |
|                   | n83     | 5, 10, 15, 20, 30                                  |                           |
| SUL_n41A-n95A     | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100            | 0                         |
|                   | n95     | 5, 10, 15                                          |                           |
| SUL_n41A-n97A     | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100            | 0                         |
|                   | n97     | 5, 10, 15, 20, 25, 30, 40, 50, 60, 80              |                           |
|                   | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100        | 1                         |
|                   | n97     | 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| SUL_n41A-n98A     | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100            | 0                         |
|                   | n98     | 5, 10, 15, 20, 25, 30, 40                          |                           |
| SUL_n41A-n99A     | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100            | 0                         |
|                   | n99     | 5, 10                                              |                           |
| SUL_n48A-n99A     | n48     | 5, 10, 15, 20, 40, 50, 60, 80, 90, 100             | 0                         |
|                   | n99     | 5, 10                                              |                           |
| SUL_n77A-n80A     | n77     | 10, 15, 20, 40, 50, 60, 80, 90, 100                | 0                         |
|                   | n80     | 5, 10, 15, 20, 25, 30                              |                           |
| SUL_n77A-n84A     | n77     | 10, 15, 20, 40, 50, 60, 80, 90, 100                | 0                         |
|                   | n84     | 5, 10, 15, 20                                      |                           |
| SUL_n77A-n99A     | n77     | 10, 15, 20, 40, 50, 60, 80, 90, 100                | 0                         |

| SUL configuration | NR Band | Channel bandwidth (MHz) (NOTE 1)                             | Bandwidth combination set |
|-------------------|---------|--------------------------------------------------------------|---------------------------|
| SUL_n78A-n80A     | n99     | 5, 10                                                        | 0                         |
|                   | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100                          |                           |
|                   | n80     | 5, 10, 15, 20, 25, 30                                        |                           |
|                   | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100              | 1                         |
| SUL_n78A-n81A     | n80     | 5, 10, 15, 20, 25, 30, 40                                    | 0                         |
|                   | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100                          |                           |
| SUL_n78A-n82A     | n81     | 5, 10, 15, 20                                                | 0                         |
|                   | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100                          |                           |
| SUL_n78A-n83A     | n82     | 5, 10, 15, 20                                                | 0                         |
|                   | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100                          |                           |
|                   | n83     | 5, 10, 15, 20                                                | 1                         |
|                   | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100              |                           |
| SUL_n78A-n84A     | n83     | 5, 10, 15, 20, 30                                            | 0                         |
|                   | n78     | 10, 15, 20, 40, 50, 60, 80, 90, 100                          |                           |
|                   | n84     | 5, 10, 15, 20                                                | 1                         |
|                   | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100              |                           |
| SUL_n78A-n86A     | n84     | 5, 10, 15, 20, 25, 30, 40, 50                                | 0                         |
|                   | n78     | 10, 15, 20, 40, 50, 60, 70, 80, 90, 100                      |                           |
| SUL_n79A-n80A     | n86     | 5, 10, 15, 20                                                | 0                         |
|                   | n79     | 40, 50, 60, 80, 100                                          |                           |
|                   | n80     | 5, 10, 15, 20, 25, 30                                        | 1                         |
|                   | n79     | 40, 50, 60, 80, 100                                          |                           |
| SUL_n79A-n81A     | n80     | 5, 10, 15, 20, 25, 30, 40                                    | 0                         |
|                   | n79     | 40, 50, 60, 80, 100                                          |                           |
| SUL_n79A-n83A     | n81     | 5, 10, 15, 20                                                | 0                         |
|                   | n79     | 40, 50, 60, 80, 100                                          |                           |
| SUL_n79A-n84A     | n83     | 5, 10, 15, 20, 30                                            | 0                         |
|                   | n79     | 40, 50, 60, 80, 100                                          |                           |
| SUL_n79A-n95A     | n84     | 5, 10, 15, 20                                                | 0                         |
|                   | n79     | 40, 50, 60, 80, 100                                          |                           |
| SUL_n79A-n97A     | n95     | 5, 10, 15                                                    | 0                         |
|                   | n79     | 40, 50, 60, 80, 100                                          |                           |
|                   | n97     | 5, 10, 15, 20, 25, 30, 40, 50, 60, 80                        | 1                         |
|                   | n79     | 40, 50, 60, 80, 100                                          |                           |
|                   | n97     | 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100           | BCS4 and BCS5             |
|                   | n79     | See n79 channel bandwidths in Table 5.3.5-1 for each carrier |                           |
| SUL_n79A-n98A     | n97     | See n97 channel bandwidths in Table 5.3.5-1 for each carrier | 0                         |
|                   | n79     | 40, 50, 60, 80, 100                                          |                           |
|                   | n98     | 5, 10, 15, 20, 25, 30, 40                                    |                           |
|                   | n79     | 40, 50, 60, 80, 100                                          |                           |

NOTE 1: The SCS of each channel bandwidth for NR band refers to Table 5.3.5-1.

**Table 5.5C-2: Supported channel bandwidths per SUL band combination with intra-band non-contiguous CA**

| SUL band combination with intra-band non-contiguous CA | SUL configuration | NR Band | Channel bandwidth (MHz) (NOTE 1)                             | Bandwidth combination set |
|--------------------------------------------------------|-------------------|---------|--------------------------------------------------------------|---------------------------|
| CA_n41(2A)-n99A                                        | SUL_n41A-n99A     | n41     | See CA_n41(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | 0                         |
|                                                        |                   | n99     | 5, 10                                                        |                           |
| CA_n48(2A)-n99A                                        | SUL_n48A-n99A     | n48     | See CA_n48(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | 0                         |
|                                                        |                   | n99     | 5, 10                                                        |                           |
| CA_n77(2A)-n99A                                        | SUL_n77A-n99A     | n77     | See CA_n77(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | 0                         |

| SUL band combination with intra-band non-contiguous CA                         | SUL configuration | NR Band | Channel bandwidth (MHz) (NOTE 1)                             | Bandwidth combination set |
|--------------------------------------------------------------------------------|-------------------|---------|--------------------------------------------------------------|---------------------------|
|                                                                                |                   | n99     | 5, 10                                                        |                           |
| CA_n78(2A)-n86A                                                                | SUL_n78A-n86A     | n78     | See CA_n78(2A) Bandwidth Combination Set 0 in Table 5.5A.2-1 | 0                         |
|                                                                                |                   | n86     | 5, 10, 15, 20                                                |                           |
| NOTE 1: The SCS of each channel bandwidth for NR band refers to Table 5.3.5-1. |                   |         |                                                              |                           |

**Table 5.5C-3: Supported channel bandwidths per SUL band combination with intra-band contiguous CA**

| SUL band combination with CA                                                   | SUL configuration | NR Band | Channel bandwidth (MHz) (NOTE 1)                          | Bandwidth combination set |
|--------------------------------------------------------------------------------|-------------------|---------|-----------------------------------------------------------|---------------------------|
| CA_n41C-n80A                                                                   | SUL_n41A-n80A     | n41     | See CA_n41C Bandwidth Combination Set 1 in Table 5.5A.1-1 | 0                         |
|                                                                                | CA_n41C-n80A      | n80     | 5, 10, 15, 20, 25, 30, 40                                 |                           |
| CA_n41C-n83A                                                                   | SUL_n41A-n83A     | n41     | See CA_n41C Bandwidth Combination Set 1 in Table 5.5A.1-1 | 0                         |
|                                                                                | CA_n41C-n83A      | n83     | 5, 10, 15, 20, 30                                         |                           |
| CA_n41C-n95A                                                                   | SUL_n41A-n95A     | n41     | See CA_n41C Bandwidth Combination Set 1 in Table 5.5A.1-1 | 0                         |
|                                                                                | CA_n41C-n95A      | n95     | 5, 10, 15                                                 |                           |
| CA_n78C-n80A                                                                   | SUL_n78A-n80A     | n78     | See CA_n78C Bandwidth Combination Set 1 in Table 5.5A.1-1 | 0                         |
|                                                                                | CA_n78C-n80A      | n80     | 5, 10, 15, 20, 25, 30, 40                                 |                           |
| CA_n78C-n84A                                                                   | SUL_n78A-n84A     | n78     | See CA_n78C Bandwidth Combination Set 1 in Table 5.5A.1-1 | 0                         |
|                                                                                | CA_n78C-n84A      | n84     | 5, 10, 15, 20, 25, 30, 40, 50                             |                           |
| CA_n79C-n80A                                                                   | SUL_n79A-n80A     | n79     | See CA_n79C Bandwidth Combination Set 0 in Table 5.5A.1-1 | 0                         |
|                                                                                | CA_n79C-n80A      | n80     | 5, 10, 15, 20, 25, 30, 40                                 |                           |
| CA_n79C-n83A                                                                   | SUL_n79A-n83A     | n79     | See CA_n79C Bandwidth Combination Set 0 in Table 5.5A.1-1 | 0                         |
|                                                                                | CA_n79C-n83A      | n83     | 5, 10, 15, 20, 30                                         |                           |
| CA_n79C-n95A                                                                   | SUL_n79A-n95A     | n79     | See CA_n79C Bandwidth Combination Set 0 in Table 5.5A.1-1 | 0                         |
|                                                                                | CA_n79C-n95A      | n95     | 5, 10, 15                                                 |                           |
| NOTE 1: The SCS of each channel bandwidth for NR band refers to Table 5.3.5-1. |                   |         |                                                           |                           |

**Table 5.5C-4: Supported channel bandwidths per SUL band combination with inter-band CA**

| SUL band combination with CA | SUL configuration | NR Band | Channel bandwidth (MHz) (NOTE 1)                | Bandwidth combination set |
|------------------------------|-------------------|---------|-------------------------------------------------|---------------------------|
| CA_n1A_n78A-n80A             | SUL_n78A-n80A     | n1      | 5, 10, 15, 20, 25, 30, 40, 50                   | 0                         |
|                              |                   | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                              |                   | n80     | 5, 10, 15, 20, 25, 30, 40                       |                           |
| CA_n1A_n78A-n84A             | SUL_n78A-n84A     | n1      | 5, 10, 15, 20, 25, 30, 40, 50                   | 0                         |
|                              |                   | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
|                              |                   | n84     | 5, 10, 15, 20, 25, 30, 40, 50                   |                           |
| CA_n1A_n78C-n84A             | SUL_n78A-n84A     | n1      | 5, 10, 15, 20, 25, 30, 40, 50                   | 0                         |

| SUL band combination with CA | SUL configuration             | NR Band | Channel bandwidth (MHz) (NOTE 1)                          | Bandwidth combination set |
|------------------------------|-------------------------------|---------|-----------------------------------------------------------|---------------------------|
|                              | CA_n78C-n84A                  | n78     | See CA_n78C Bandwidth Combination Set 1 in Table 5.5A.1-1 |                           |
|                              |                               | n84     | 5, 10, 15, 20, 25, 30, 40, 50                             |                           |
| CA_n3A_n41A-n80A             | SUL_n41A-n80A                 | n3      | 5, 10, 15, 20, 25, 30, 40                                 | 0                         |
|                              |                               | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100                   |                           |
|                              |                               | n80     | 5, 10, 15, 20, 25, 30, 40                                 |                           |
| CA_n3A_n41C-n80A             | SUL_n41A-n80A                 | n3      | 5, 10, 15, 20, 25, 30, 40                                 | 0                         |
|                              |                               | n41     | See CA_n41C Bandwidth Combination Set 1 in Table 5.5A.1-1 |                           |
|                              |                               | n80     | 5, 10, 15, 20, 25, 30, 40                                 |                           |
| CA_n3A_SUL_n78A-n80A         | SUL_n78A-n80A                 | n3      | 5, 10, 15, 20, 25, 30, 40                                 | 0                         |
|                              |                               | n78     | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100           |                           |
|                              |                               | n80     | 5, 10, 15, 20, 25, 30, 40                                 |                           |
| CA_n3A_n78C-n80A             | SUL_n78A-n80A<br>CA_n78C-n80A | n3      | 5, 10, 15, 20, 25, 30, 40                                 | 0                         |
|                              |                               | n78     | See CA_n78C Bandwidth Combination Set 1 in Table 5.5A.1-1 |                           |
|                              |                               | n80     | 5, 10, 15, 20, 25, 30, 40                                 |                           |
| CA_n3A_n79A-n80A             | SUL_n79A-n80A                 | n3      | 5, 10, 15, 20, 25, 30, 40                                 | 0                         |
|                              |                               | n79     | 40, 50, 60, 80, 100                                       |                           |
|                              |                               | n80     | 5, 10, 15, 20, 25, 30, 40                                 |                           |
| CA_n3A_n79C-n80A             | SUL_n79A-n80A<br>CA_n79C-n80A | n3      | 5, 10, 15, 20, 25, 30, 40                                 | 0                         |
|                              |                               | n79     | See CA_n79C Bandwidth Combination Set 0 in Table 5.5A.1-1 |                           |
|                              |                               | n80     | 5, 10, 15, 20, 25, 30, 40                                 |                           |
| CA_n28A_n41A-n83A            | SUL_n41A-n83A                 | n28     | 5, 10, 15, 20, 30                                         | 0                         |
|                              |                               | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100                   |                           |
|                              |                               | n83     | 5, 10, 15, 20, 30                                         |                           |
| CA_n28A_n41C-n83A            | SUL_n41A-n83A<br>CA_n41C-n83A | n28     | 5, 10, 15, 20, 30                                         | 0                         |
|                              |                               | n41     | See CA_n41C Bandwidth Combination Set 1 in Table 5.5A.1-1 |                           |
|                              |                               | n83     | 5, 10, 15, 20, 30                                         |                           |
| CA_n28A_n79A-n83A            | SUL_n79A-n83A                 | n28     | 5, 10, 15, 20, 30                                         | 0                         |
|                              |                               | n79     | 40, 50, 60, 80, 100                                       |                           |
|                              |                               | n83     | 5, 10, 15, 20, 30                                         |                           |
| CA_n28A_n79C-n83A            | SUL_n79A-n83A<br>CA_n79C-n83A | n28     | 5, 10, 15, 20, 30                                         | 0                         |
|                              |                               | n79     | See CA_n79C Bandwidth Combination Set 0 in Table 5.5A.1-1 |                           |
|                              |                               | n83     | 5, 10, 15, 20, 30                                         |                           |
| CA_n41A_n79A-n80A            | SUL_n79A-n80A                 | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100                   | 0                         |
|                              |                               | n79     | 40, 50, 60, 80, 100                                       |                           |
|                              |                               | n80     | 5, 10, 15, 20, 25, 30, 40                                 |                           |
| CA_n41A_n79A-n83A            | SUL_n79A-n83A                 | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100                   | 0                         |

| SUL band combination with CA | SUL configuration | NR Band | Channel bandwidth (MHz) (NOTE 1)                   | Bandwidth combination set |
|------------------------------|-------------------|---------|----------------------------------------------------|---------------------------|
|                              |                   | n79     | 40, 50, 60, 80, 100                                |                           |
|                              |                   | n83     | 5, 10, 15, 20, 30                                  |                           |
| CA_n41A_n79A-n97A            | SUL_n79A-n97A     | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100            | 0                         |
|                              |                   | n79     | 40, 50, 60, 80, 100                                |                           |
|                              |                   | n97     | 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n79A_n41A-n80A            | SUL_n41A-n80A     | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100            | 0                         |
|                              |                   | n79     | 40, 50, 60, 80, 100                                |                           |
|                              |                   | n80     | 5, 10, 15, 20, 25, 30, 40                          |                           |
| CA_n79A_n41A-n83A            | SUL_n41A-n83A     | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100            | 0                         |
|                              |                   | n79     | 40, 50, 60, 80, 100                                |                           |
|                              |                   | n83     | 5, 10, 15, 20, 30                                  |                           |
| CA_n79A_n41A-n97A            | SUL_n41A-n97A     | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100            | 0                         |
|                              |                   | n79     | 40, 50, 60, 80, 100                                |                           |
|                              |                   | n97     | 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                           |
| CA_n28A-n79A_n41A-n83A       | SUL_n41A-n83A     | n28     | 5, 10, 15, 20, 30                                  | 0                         |
|                              |                   | n41     | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100            |                           |
|                              |                   | n79     | 40, 50, 60, 80, 100                                |                           |
|                              |                   | n83     | 5, 10, 15, 20, 30                                  |                           |
| CA_n28A-n41A_n79A-n83A       | SUL_n79A-n83A     | n28     | 5, 10, 15, 20, 30                                  | 0                         |
|                              |                   | n41     | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100        |                           |
|                              |                   | n79     | 40, 50, 60, 80, 100                                |                           |
|                              |                   | n83     | 5, 10, 15, 20, 30                                  |                           |

NOTE 1: The SCS of each channel bandwidth for NR band refers to Table 5.3.5-1.

## 6 Transmitter characteristics

### 6.1 General

Unless otherwise stated, the transmitter characteristics are specified at the antenna connector of the UE with a single or multiple transmit antenna(s). For UE with integral antenna only, a reference antenna with a gain of 0 dBi is assumed.

For UEs that do not indicate IE *dualPA-Architecture*, transmitter requirements for CA operation apply only when the DMRS initialization parameters (including the case when the UE applies cell ID as DMRS scrambling ID) are different across all CCs. The UE may use higher MPR values outside this limitation.

Transmitter requirements for UL MIMO operation apply when the UE transmits on 2 ports on the same CDM group. The UE may use higher MPR values outside this limitation.

The applicability of transmitter requirements for Band n90 is in accordance with that for Band n41; a UE supporting Band n90 shall meet the minimum requirements for Band n41.

NOTE: For FRMCS (Future Railway Mobile Communication System) operation in bands n100 and n101, the EIRP requirements shall be converted to conducted requirements based on the post chipset unit antenna connector gain  $G_{n100\text{post connector}}$  or  $G_{n101\text{post connector}}$  declared for the UE following the principle described in annex M.

#### 6.1A General

The minimum requirements for band combinations including Band n41 also apply for the corresponding band combinations with Band n90 replacing Band n41 but with otherwise identical parameters. For brevity the said band combinations with Band n90 are not listed in the tables below but are covered by this specification.

#### 6.1F General

For wideband operations, the minimum requirements for the transmitter characteristics are specified for transmissions on one scheduled RB set or  $\geq 1$  scheduled contiguous RB set(s) within the UE channel. The requirements apply with configured UL intra-cell guard bands of non-zero size according to Table 5.3.3-2, with the union of the scheduled RB sets and the intra-cell guard bands.

Unless stated otherwise, when a clause is not present for shared spectrum channel access, the general requirements and the additional clause requirements (suffices A,B,D) in clause 6 apply.

## 6.2 Transmitter power

### 6.2.1 UE maximum output power

The following UE Power Classes define the maximum output power for any transmission bandwidth within the channel bandwidth of NR carrier unless otherwise stated. The period of measurement shall be at least one sub frame (1ms).

Table 6.2.1-1: UE Power Class

| NR band | Class 1 (dBm) | Tolerance (dB) | Class 1.5 (dBm) | Tolerance (dB) | Class 2 (dBm) | Tolerance (dB)     | Class 3 (dBm) | Tolerance (dB) |
|---------|---------------|----------------|-----------------|----------------|---------------|--------------------|---------------|----------------|
| n1      |               |                |                 |                | 26            | +2/-3              | 23            | $\pm 2$        |
| n2      |               |                |                 |                |               |                    | 23            | $\pm 2^3$      |
| n3      |               |                |                 |                | 26            | +2/-3 <sup>3</sup> | 23            | $\pm 2^3$      |
| n5      |               |                |                 |                |               |                    | 23            | $\pm 2$        |
| n7      |               |                |                 |                |               |                    | 23            | $\pm 2^3$      |
| n8      |               |                |                 |                |               |                    | 23            | $\pm 2^3$      |
| n12     |               |                |                 |                |               |                    | 23            | $\pm 2^3$      |
| n13     |               |                |                 |                |               |                    | 23            | $\pm 2$        |



|      |                   |       |                 |                    |    |                    |    |                    |
|------|-------------------|-------|-----------------|--------------------|----|--------------------|----|--------------------|
| n14  | 31 <sup>6,7</sup> | +2/-3 |                 |                    |    |                    | 23 | ±2                 |
| n18  |                   |       |                 |                    |    |                    | 23 | ±2                 |
| n20  |                   |       |                 |                    |    |                    | 23 | ±2 <sup>3</sup>    |
| n24  |                   |       |                 |                    |    |                    | 23 | +2/-3 <sup>3</sup> |
| n25  |                   |       |                 |                    |    |                    | 23 | ±2 <sup>3</sup>    |
| n26  |                   |       |                 |                    |    |                    | 23 | ±2 <sup>3</sup>    |
| n28  |                   |       |                 |                    |    |                    | 23 | +2/-2.5            |
| n30  |                   |       |                 |                    |    |                    | 23 | ±2                 |
| n34  |                   |       |                 |                    | 26 | +2/-3              | 23 | ±2                 |
| n38  |                   |       |                 |                    |    |                    | 23 | ±2                 |
| n39  |                   |       |                 |                    | 26 | +2/-3              | 23 | ±2                 |
| n40  |                   |       |                 |                    | 26 | +2/-3              | 23 | ±2                 |
| n41  |                   |       | 29 <sup>5</sup> | +2/-3 <sup>3</sup> | 26 | +2/-3 <sup>3</sup> | 23 | ±2 <sup>3</sup>    |
| n47  |                   |       |                 |                    |    |                    | 23 | ±2                 |
| n48  |                   |       |                 |                    |    |                    | 23 | +2/-3              |
| n50  |                   |       |                 |                    |    |                    | 23 | ±2                 |
| n51  |                   |       |                 |                    |    |                    | 23 | ±2                 |
| n53  |                   |       |                 |                    |    |                    | 23 | ±2                 |
| n65  |                   |       |                 |                    |    |                    | 23 | ±2                 |
| n66  |                   |       |                 |                    |    |                    | 23 | ±2                 |
| n70  |                   |       |                 |                    |    |                    | 23 | ±2                 |
| n71  |                   |       |                 |                    |    |                    | 23 | +2/-2.5            |
| n74  |                   |       |                 |                    |    |                    | 23 | ±2                 |
| n77  |                   |       | 29 <sup>5</sup> | +2/-3              | 26 | +2/-3              | 23 | +2/-3              |
| n78  |                   |       | 29 <sup>5</sup> | +2/-3              | 26 | +2/-3              | 23 | +2/-3              |
| n79  |                   |       | 29 <sup>5</sup> | +2/-3              | 26 | +2/-3              | 23 | +2/-3              |
| n80  |                   |       |                 |                    |    |                    | 23 | ±2 <sup>3</sup>    |
| n81  |                   |       |                 |                    |    |                    | 23 | ±2                 |
| n82  |                   |       |                 |                    |    |                    | 23 | ±2                 |
| n83  |                   |       |                 |                    |    |                    | 23 | +2/-2.5            |
| n84  |                   |       |                 |                    |    |                    | 23 | ±2                 |
| n85  |                   |       |                 |                    |    |                    | 23 | ±2 <sup>3</sup>    |
| n86  |                   |       |                 |                    |    |                    | 23 | ±2                 |
| n89  |                   |       |                 |                    |    |                    | 23 | ±2                 |
| n91  |                   |       |                 |                    |    |                    | 23 | ±2 <sup>3, 4</sup> |
| n92  |                   |       |                 |                    |    |                    | 23 | ±2 <sup>3, 4</sup> |
| n93  |                   |       |                 |                    |    |                    | 23 | ±2 <sup>3, 4</sup> |
| n94  |                   |       |                 |                    |    |                    | 23 | ±2 <sup>3, 4</sup> |
| n95  |                   |       |                 |                    | 26 | +2/-3              | 23 | ±2                 |
| n97  |                   |       |                 |                    | 26 | +2/-3              | 23 | ±2                 |
| n98  |                   |       |                 |                    | 26 | +2/-3              | 23 | ±2                 |
| n99  |                   |       |                 |                    |    |                    | 23 | +2/-3 <sup>3</sup> |
| n100 |                   |       |                 |                    |    |                    | 23 | ±2                 |
| n101 |                   |       |                 |                    |    |                    | 23 | ±2                 |
| n104 |                   |       |                 |                    | 26 | +2/-3              | 23 | +2/-3              |

NOTE 1:  $P_{\text{PowerClass}}$  is the maximum UE power specified without taking into account the tolerance.

NOTE 2: Power class 3 is default power class unless otherwise stated.

NOTE 3: Refers to the transmission bandwidths confined within  $F_{\text{UL\_low}}$  and  $F_{\text{UL\_low}} + 4 \text{ MHz}$  or  $F_{\text{UL\_high}} - 4 \text{ MHz}$  and  $F_{\text{UL\_high}}$ , the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB.

NOTE 4: The maximum output power requirement is relaxed by reducing the lower tolerance limit by 0.3 dB.

NOTE 5: Achieved via 2Tx.

NOTE 6: Generally, PC1 UE is not targeted for smartphone form factor.

NOTE 7: The UE power class 1 requirements for Band n14 are applicable for public safety scenario only.

If a UE supports a different power class than the default UE power class for the band and the supported power class enables the higher maximum output power than that of the default power class:

- if the field of UE capability *maxUplinkDutyCycle-PC2-FR1* is absent and the field of UE capability *maxUplinkDutyCycle-PC1dot5-MPE-FR1* is absent and the percentage of uplink symbols transmitted in a certain evaluation period is larger than 50% (The exact evaluation period is no less than one radio frame); or
- if the field of UE capability *maxUplinkDutyCycle-PC2-FR1* is not absent and the percentage of uplink symbols transmitted in a certain evaluation period is larger than *maxUplinkDutyCycle-PC2-FR1* as defined in TS 38.306 (The exact evaluation period is no less than one radio frame); or

- if the field of UE capability *maxUplinkDutyCycle-PC1dot5-MPE-FR1* is not absent and half the percentage of uplink symbols transmitted in a certain evaluation period is larger than *maxUplinkDutyCycle-PC1dot5-MPE-FR1* as defined in TS 38.306 (The exact evaluation period is no less than one radio frame); or
- if the IE P-Max as defined in TS 38.331 [7] is provided and set to the maximum output power of the default power class or lower;
- shall apply all requirements for the default power class to the supported power class and set the configured transmitted power as specified in clause 6.2.4;
- else if the UE does not support a power class with higher maximum output power than PC2; or
- if the field of UE capability *maxUplinkDutyCycle-PC2-FR1* is absent and the field of UE capability *maxUplinkDutyCycle-PC1dot5-MPE-FR1* is absent and the percentage of uplink symbols transmitted in a certain evaluation period is larger than 25% (The exact evaluation period is no less than one radio frame); or
- if the field of UE capability *maxUplinkDutyCycle-PC2-FR1* is not absent and the percentage of uplink symbols transmitted in a certain evaluation period is larger than  $0.5 \cdot \text{maxUplinkDutyCycle-PC2-FR1}$  (The exact evaluation period is no less than one radio frame); or
- if the field of UE capability *maxUplinkDutyCycle-PC1dot5-MPE-FR1* is not absent and the percentage of uplink symbols transmitted in a certain evaluation period is larger than *maxUplinkDutyCycle-PC1dot5-MPE-FR1* as defined in TS 38.306 (The exact evaluation period is no less than one radio frame); or
- if the IE P-Max as defined in TS 38.331 [7] is provided and set to the maximum output power of the power class 2 or lower;
- shall apply all requirements for power class 2 to the supported power class and set the configured transmitted power as specified in clause 6.2.4;
- else shall apply all requirements for the supported power class and set the configured transmitted power as specified in clause 6.2.4.

## 6.2.11 Void

## 6.2.2 UE maximum output power reduction

UE is allowed to reduce the maximum output power due to higher order modulations and transmit bandwidth configurations. For UE power class 2 and 3 and UE power class 1, the allowed maximum power reduction (MPR) is defined in Table 6.2.2-2, Table 6.2.2-1 and Table 6.2.2-5, respectively for channel bandwidths  $\leq 100$  MHz. For UE power class 1.5, the allowed maximum power reduction (MPR) is defined in Table 6.2D.2-2 and Table 6.2D.2-3 in accordance with the indicated *modifiedMPR-Behavior* specified in Table L.1-1 for channel bandwidths  $\leq 100$  MHz. . When A UE that indicates PC1.5 for a given band is limited to PC2 by the rules in clause 6.2.1, the MPR requirements in Table 6.2.2-2 apply. Unless otherwise specified, ‘pi/2 BPSK’ refers to both variants of pi/2 BPSK referenced in table 6.2.2-1.

If the relative channel bandwidth  $\leq 4\%$  for TDD bands or  $\leq 3\%$  for FDD band, the  $\Delta\text{MPR}$  is set to zero.

If the relative channel bandwidth  $> 4\%$  for TDD bands or  $> 3\%$  for FDD bands, the  $\Delta\text{MPR}$  is defined in Table 6.2.2-3.

Where relative channel bandwidth =  $2 \cdot \text{BW}_{\text{Channel}} / (\text{F}_{\text{UL\_low}} + \text{F}_{\text{UL\_high}})$

The allowed MPR for SRS, PUCCH formats 0, 1, 3 and 4, and PRACH shall be as specified for QPSK modulated DFT-s-OFDM of equivalent RB allocation. The allowed MPR for PUCCH format 2 shall be as specified for QPSK modulated CP-OFDM of equivalent RB allocation.

**Table 6.2.2-1 Maximum power reduction (MPR) for power class 3**

| Modulation | MPR (dB)            |                      |                      |
|------------|---------------------|----------------------|----------------------|
|            | Edge RB allocations | Outer RB allocations | Inner RB allocations |

|            |                            |              |              |              |
|------------|----------------------------|--------------|--------------|--------------|
| DFT-s-OFDM | Pi/2 BPSK w/ Rel-15 DMRS   | $\leq 3.5^1$ | $\leq 1.2^1$ | $\leq 0.2^1$ |
|            |                            | $\leq 0.5^2$ | $\leq 0.5^2$ | $0^2$        |
|            | Pi/2 BPSK w Pi/2 BPSK DMRS | $\leq 0.5^2$ | $0^2$        | $0^2$        |
|            | QPSK                       | $\leq 1$     |              | 0            |
|            | 16 QAM                     | $\leq 2$     |              | $\leq 1$     |
|            | 64 QAM                     | $\leq 2.5$   |              |              |
| CP-OFDM    | 256 QAM                    | $\leq 4.5$   |              |              |
|            | QPSK                       | $\leq 3$     |              | $\leq 1.5$   |
|            | 16 QAM                     | $\leq 3$     |              | $\leq 2$     |
|            | 64 QAM                     | $\leq 3.5$   |              |              |
|            | 256 QAM                    | $\leq 6.5$   |              |              |

NOTE 1: Applicable for UE operating in TDD mode with Pi/2 BPSK modulation and UE indicates support for UE capability *powerBoosting-pi2BPSK* and if the IE *powerBoostPi2BPSK* is set to 1 and 40 % or less slots in radio frame are used for UL transmission for bands n40, n41, n77, n78 and n79. The reference power of 0 dB MPR is 26 dBm.

NOTE 2: Applicable for conditions where note 1 does not apply.

Table 6.2.2-2 Maximum power reduction (MPR) for power class 2

| Modulation |           | MPR (dB)            |                      |                      |
|------------|-----------|---------------------|----------------------|----------------------|
|            |           | Edge RB allocations | Outer RB allocations | Inner RB allocations |
| DFT-s-OFDM | Pi/2 BPSK | ≤ 3.5               | ≤ 0.5                | 0                    |
|            | QPSK      | ≤ 3.5               | ≤ 1                  | 0                    |
|            | 16 QAM    | ≤ 3.5               | ≤ 2                  | ≤ 1                  |
|            | 64 QAM    | ≤ 3.5               | ≤ 2.5                |                      |
|            | 256 QAM   | ≤ 4.5               |                      |                      |
| CP-OFDM    | QPSK      | ≤ 3.5               | ≤ 3                  | ≤ 1.5                |
|            | 16 QAM    | ≤ 3.5               | ≤ 3                  | ≤ 2                  |
|            | 64 QAM    | ≤ 3.5               |                      |                      |
|            | 256 QAM   | ≤ 6.5               |                      |                      |

Table 6.2.2-3:  $\Delta$ MPR

| NR Band     | Power class                     | Channel bandwidth | $\Delta$ MPR (dB) |
|-------------|---------------------------------|-------------------|-------------------|
| n28 and n83 | Power class 3                   | 25 MHz, 30 MHz    | 0.5               |
| n40 and n97 | Power class 3 and power class 2 | 100 MHz           | 1                 |

Table 6.2.2-4 Void

Table 6.2.2-4a Void

Table 6.2.2-5 Maximum power reduction (MPR) for power class 1

| Modulation |                            | MPR (dB)            |                      |                      |
|------------|----------------------------|---------------------|----------------------|----------------------|
|            |                            | Edge RB allocations | Outer RB allocations | Inner RB allocations |
| DFT-s-OFDM | Pi/2 BPSK w/ Rel-15 DMRS   | $\leq 0.5$          | $\leq 0.5$           | 0                    |
|            | Pi/2 BPSK w Pi/2 BPSK DMRS | $\leq 0.5$          | 0                    | 0                    |
|            | QPSK                       | $\leq 1$            |                      | 0                    |
|            | 16 QAM                     | $\leq 2$            |                      | $\leq 1$             |
|            | 64 QAM                     | $\leq 2.5$          |                      |                      |
|            | 256 QAM                    | $\leq 4.5$          |                      |                      |
| CP-OFDM    | QPSK                       | $\leq 3$            |                      | $\leq 1.5$           |
|            | 16 QAM                     | $\leq 3$            |                      | $\leq 2$             |
|            | 64 QAM                     | $\leq 3.5$          |                      |                      |
|            | 256 QAM                    | $\leq 6.5$          |                      |                      |

Where the following parameters are defined to specify valid RB allocation ranges for Outer and Inner RB allocations:

$N_{RB}$  is the maximum number of RBs for a given Channel bandwidth and sub-carrier spacing defined in Table 5.3.2-1.  
 $RB_{Start,Low} = \max(1, \text{floor}(L_{CRB}/2))$

where  $\max()$  indicates the largest value of all arguments and  $\text{floor}(x)$  is the greatest integer less than or equal to  $x$ .

$$RB_{Start,High} = N_{RB} - RB_{Start,Low} - L_{CRB}$$

The RB allocation is an Inner RB allocation if the following conditions are met

$$RB_{Start,Low} \leq RB_{Start} \leq RB_{Start,High}, \text{ and}$$

$$L_{CRB} \leq \text{ceil}(N_{RB}/2)$$

where  $\text{ceil}(x)$  is the smallest integer greater than or equal to  $x$ .

An Edge RB allocation is the one for which the RB(s) is (are) allocated at the lowermost or uppermost edge of the channel  $L_{CRB} \leq 2$  RBs.

The RB allocation is an Outer RB allocation for all other allocations which are not an Inner RB allocation or Edge RB allocation.

If CP-OFDM allocation satisfies following conditions, it is considered as almost contiguous allocation

$$N_{RB\_gap} / (N_{RB\_alloc} + N_{RB\_gap}) \leq 0.25$$

and  $N_{RB\_alloc} + N_{RB\_gap}$  is larger than 106, 51 or 24 RBs for 15 kHz, 30 kHz or 60 kHz respectively where  $N_{RB\_gap}$  is the total number of unallocated RBs between allocated RBs and  $N_{RB\_alloc}$  is the total number of allocated RBs. The size and location of allocated and unallocated RBs are restricted by RBG parameters specified in clause 6.1.2.2 of TS 38.214 [10]. For UE that indicates support for *almostContiguousCP-OFDM-UL*, the almost contiguous signals in power class 1.5, power class 2 and 3, the allowed maximum power reduction defined in Table 6.2.2-2, Table 6.2.2-1 and Tables 6.2D.2-1 to 6.2D.2-3 are increased by

$$\text{CEIL}\{ 10 \log_{10}(1 + N_{RB\_gap} / N_{RB\_alloc}), 0.5 \} \text{ dB},$$

where  $\text{CEIL}\{x, 0.5\}$  means  $x$  rounding upwards to closest 0.5dB. The parameter of  $L_{CRB}$  which is used to specify valid RB allocation ranges for Outer and Inner RB allocations is replaced by  $(N_{RB\_alloc} + N_{RB\_gap})$  for almost contiguous allocation cases

For the UE maximum output power modified by MPR, the power limits specified in clause 6.2.4 apply.

## 6.2.3 UE additional maximum output power reduction

### 6.2.3.1 General

Additional emission requirements can be signalled by the network. Each additional emission requirement is associated with a unique network signalling (NS) value indicated in RRC signalling by an NR frequency band number of the applicable operating band and an associated value in the field *additionalSpectrumEmission*. Throughout this specification, the notion of indication or signalling of an NS value refers to the corresponding indication of an NR frequency band number of the applicable operating band, the IE field *freqBandIndicatorNR* and an associated value of *additionalSpectrumEmission* in the relevant RRC information elements [7].

To meet the additional requirements, additional maximum power reduction (A-MPR) is allowed for the maximum output power as specified in Table 6.2.1-1. Unless stated otherwise, the total reduction to UE maximum output power is  $\max(\text{MPR} + \Delta\text{MPR}, \text{A-MPR})$  where MPR and  $\Delta\text{MPR}$  are defined in clause 6.2.2. Outer and inner allocation notation used in clause 6.2.3 is defined in clause 6.2.2. Unless stated otherwise, Edge RB allocations get the same AMPR as Outer RB allocations. In absence of modulation and waveform types the A-MPR applies to all modulation and waveform types.

Table 6.2.3.1-1 specifies the additional requirements with their associated network signalling values and the allowed A-MPR and applicable operating band(s) for each NS value. In case of a power class 3 UE, when IE *powerBoostPi2BPSK* is set to 1, power class 2 A-MPR values apply. The mapping of NR frequency band numbers and values of the *additionalSpectrumEmission* to network signalling labels is specified in Table 6.2.3.1-1A.

For almost contiguous allocations in CP-OFDM waveforms in power class 1.5, 2 and 3, the allowed A-MPR defined in clause 6.2.3 is increased by  $\text{CEIL}\{10 \log_{10}(1 + N_{\text{RB\_gap}} / N_{\text{RB\_alloc}}), 0.5\}$  dB, where  $\text{CEIL}\{x, 0.5\}$  means  $x$  rounding upwards to closest 0.5dB,  $N_{\text{RB\_gap}}$  is the total number of unallocated RBs between allocated RBs and  $N_{\text{RB\_alloc}}$  is the total number of allocated RBs, and the parameter  $L_{\text{CRB}}$  is replaced by  $N_{\text{RB\_alloc}} + N_{\text{RB\_gap}}$  in specifying the RB allocation regions.

Unless otherwise specified, pi/2 BPSK in following A-MPR tables refers to both variants of pi/2 BPSK referenced in 6.2.2 tables 6.2.2-1.

**Table 6.2.3.1-1: Additional maximum power reduction (A-MPR)**

| Network signalling label | Requirements (clause)   | NR Band                    | Channel bandwidth (MHz)                                    | Resources blocks ( $N_{\text{RB}}$ ) | A-MPR (dB)                                                                   |
|--------------------------|-------------------------|----------------------------|------------------------------------------------------------|--------------------------------------|------------------------------------------------------------------------------|
| NS_01                    |                         | Table 5.2-1 (NOTE 8)       | 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100 | Table 5.3.2-1                        | N/A                                                                          |
| NS_03                    | 6.5.2.3.3               | n2, n25, n66, n70, n86     |                                                            |                                      | Clause 6.2.3.7                                                               |
| NS_03U                   | 6.5.2.3.3, 6.5.2.4.2    | n2, n25, n66, n86 (NOTE 1) |                                                            |                                      | Clause 6.2.3.7                                                               |
| NS_04                    | 6.5.2.3.2, 6.5.3.3.1    | n41, n90                   | 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100 |                                      | Clause 6.2.3.2                                                               |
| NS_05                    | 6.5.3.3.4               | n1, n65, n84               | 5, 10, 15, 20 (NOTE 2)                                     |                                      | Clause 6.2.3.4 (NOTE 7)                                                      |
| NS_05U                   | 6.5.3.3.4, 6.5.2.4.2    | n1, n65, n84 (NOTE 1)      | 5, 10, 15, 20                                              |                                      | Clause 6.2.3.4 (NOTE 7)                                                      |
| NS_06                    | 6.5.2.3.4               | n12, n85<br>n13, n14       | 5, 10, 15<br>5, 10                                         |                                      | N/A                                                                          |
| NS_07                    | 6.5.2.3.4<br>6.5.3.3.26 | n13                        | 5, 10                                                      | Table 6.2.3.29-1                     | Table 6.2.3.29-2                                                             |
| NS_10                    |                         | n20, n82                   | 15, 20                                                     | Table 6.2.3.3-1                      | Table 6.2.3.3-1                                                              |
| NS_12                    | 6.5.3.3.17              | n26                        | 5, 10                                                      | Table 6.2.3.21-1                     | Table 6.2.3.21-2                                                             |
| NS_13                    | 6.5.3.3.18              | n26                        | 5                                                          | Table 6.2.3.22-1                     | Table 6.2.3.22-2                                                             |
| NS_14                    | 6.5.3.3.19              | n26                        | 10, 15, 20                                                 | Table 6.2.3.23-1                     | Table 6.2.3.23-2                                                             |
| NS_15                    | 6.5.3.3.20              | n26                        | 5, 10, 15, 20                                              | Table 6.2.3.24-1                     | Table 6.2.3.24-2                                                             |
| NS_17                    | 6.5.3.3.2               | n28, n83                   | 5, 10                                                      | Table 5.3.2-1                        | N/A                                                                          |
| NS_18                    | 6.5.3.3.3               | n28, n83                   | 5<br>10, 15, 20<br>25, 30                                  |                                      | Table 6.2.3.13-1, A1<br>Table 6.2.3.13-1, A2<br>Table 6.2.3.13-1, A3, A4, A5 |
| NS_21                    | 6.5.2.3.9<br>6.5.3.3.12 | n30                        | 5, 10                                                      |                                      | Clause 6.2.3.14                                                              |
| NS_24                    | 6.5.3.3.13              | n65 (NOTE 4)               | 5, 10, 15, 20                                              | Table 6.2.3.15-1                     | Clause 6.2.3.15                                                              |
| NS_27                    | 6.5.2.3.8<br>6.5.3.3.14 | n48                        | 5, 10, 15, 20, 30, 40                                      | Table 6.2.3.16-1                     | Table 6.2.3.16-2                                                             |
| NS_35                    | 6.5.2.3.1               | n71                        | 5, 10, 15, 20                                              | Table 5.3.2-1                        | N/A                                                                          |
| NS_37                    | 6.5.3.3.6               | n74 (NOTE 3)               | 10, 15                                                     | Table 6.2.3.8-1                      | Table 6.2.3.8-1                                                              |
| NS_38                    | 6.5.3.3.7               | n74                        | 5, 10, 15, 20                                              | Table 6.2.3.9-1                      | Table 6.2.3.9-1                                                              |
| NS_39                    | 6.5.3.3.8               | n74                        | 10, 15, 20                                                 | Table 6.2.3.10-1                     | Table 6.2.3.10-1                                                             |
| NS_40                    | 6.5.3.3.9               | n51                        | 5                                                          |                                      | Table                                                                        |

| Network signalling label | Requirements (clause) | NR Band                                                                       | Channel bandwidth (MHz)                         | Resources blocks ( $N_{RB}$ )         | A-MPR (dB)                                     |
|--------------------------|-----------------------|-------------------------------------------------------------------------------|-------------------------------------------------|---------------------------------------|------------------------------------------------|
|                          |                       |                                                                               |                                                 |                                       | 6.2.3.5-1                                      |
| NS_41                    | 6.5.3.3.10            | n50                                                                           | 5, 10, 15, 20, 30, 40, 50, 60                   |                                       | Table 6.2.3.11-1                               |
| NS_42                    | 6.5.3.3.11            | n50                                                                           | 5, 10, 15, 20, 30, 40, 50, 60                   |                                       | Table 6.2.3.12-1                               |
| NS_43                    | 6.5.3.3.5             | n8, n81                                                                       | 5, 10, 15                                       |                                       | Clause 6.2.3.6                                 |
| NS_43U                   | 6.5.3.3.5, 6.5.2.4.2  | n8, n81 (NOTE 1)                                                              | 5, 10, 15                                       |                                       | Clause 6.2.3.6                                 |
| NS_44                    | 6.5.3.3.24            | n38                                                                           | 25, 30, 40                                      | Table 6.2.3.20-1                      | Table 6.2.3.20-1                               |
| NS_45                    | 6.5.3.3.21            | n53                                                                           | 5, 10                                           |                                       | Clause 6.2.3.25                                |
| NS_46                    | 6.5.3.3.25            | n7                                                                            | 25, 30, 35, 40, 50                              | Table 6.2.3.17-1                      | Table 6.2.3.17-2                               |
| NS_47                    | 6.5.3.3.15            | n41 (Note 5)                                                                  | 30 (Note 5)                                     | Table 6.2.3.18-1<br>Table 6.2.3.18-3  | Table 6.2.3.18-2<br>Table 6.2.3.18-4           |
| NS_48                    | 6.5.3.3.22            | n1 and n84                                                                    | 10, 15, 20, 25, 30, 40, 45, 50                  | Table 6.2.3.26-1,<br>Table 6.2.3.26-3 | Table 6.2.3.26-2,<br>Table 6.2.3.26-4 (NOTE 7) |
| NS_49                    | 6.5.3.3.23            | n1 and n84                                                                    | 10, 15, 20, 25, 30, 40, 45, 50                  | Table 6.2.3.27-1,<br>Table 6.2.3.27-3 | Table 6.2.3.27-2,<br>Table 6.2.3.27-4 (NOTE 7) |
| NS_50                    | 6.5.3.3.16            | n39, n98                                                                      | 10, 15, 20, 25, 30, 40                          |                                       | Clause 6.2.3.19                                |
| NS_51                    | 6.5.3.3.22            | n65                                                                           | 50                                              | Table 6.2.3.28-1                      | Table 6.2.3.28-2                               |
| NS_55                    | NOTE 6                | n77                                                                           | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                                       | N/A                                            |
| NS_56                    | 6.5.3.3.27            | n24, n99                                                                      | 5, 10                                           |                                       | Clause 6.2.3.30                                |
| NS_57                    | NOTE 10               | n77                                                                           | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |                                       | N/A                                            |
| NS_100                   | 6.5.2.4.2             | n1, n2, n3, n5, n8, n18, n25, n26, n65, n66, n80, n81, n84, n86, n89 (NOTE 1) |                                                 |                                       | Table 6.2.3.1-2                                |

NOTE 1: This NS can be signalled for NR bands that have UTRA services deployed.

NOTE 2: No A-MPR is applied for 5 MHz  $BW_{Channel}$  where the upper channel edge is  $\geq 1930$  MHz, 10 MHz  $BW_{Channel}$  where the upper channel edge is  $\geq 1950$  MHz and 15 MHz  $BW_{Channel}$  where the upper channel edge is  $\geq 1955$  MHz and 20 MHz  $BW_{Channel}$  where the upper channel edge is  $\geq 1970$  MHz.

NOTE 3: Applicable when the NR carrier is within 1447.9 – 1462.9 MHz.

NOTE 4: Applicable when the upper edge of the channel bandwidth frequency is greater than 1980 MHz.

NOTE 5: Applicable when the NR carrier is within 2545 – 2575 MHz.  $BW_{Channel}$  less than 30 MHz are addressed in Table 6.5.3.2-1.

NOTE 6: This NS value is applicable for cells in the range 3450 – 3550 MHz for operations in the USA. This NS value does not indicate any additional spurious emission and maximum output power reduction requirements.

NOTE 7: The 1Tx architecture is assumed. For power class 2 UE indicating  $txDiversity-r16$  [TS 38.306], the additional relaxation of [2] dB is applicable.

NOTE 8: The NS\_01 label with the field *additionalPmax* [7] absent is default for all NR bands.

NOTE 9: Void

NOTE 10: This NS value is applicable for cells below 3980 MHz that are partly or fully within the range 3650-3980 MHz for operations in Canada. This NS value does not indicate any additional spurious emission and maximum output power reduction requirements.

Table 6.2.3.1-1A: Mapping of network signalling label

| NR band           | Value of <i>additionalSpectrumEmission</i> |        |        |        |        |       |   |   |
|-------------------|--------------------------------------------|--------|--------|--------|--------|-------|---|---|
|                   | 0                                          | 1      | 2      | 3      | 4      | 5     | 6 | 7 |
| n1                | NS_01                                      | NS_100 | NS_05  | NS_05U | NS_48  | NS_49 |   |   |
| n2                | NS_01                                      | NS_100 | NS_03  | NS_03U |        |       |   |   |
| n3                | NS_01                                      | NS_100 |        |        |        |       |   |   |
| n5                | NS_01                                      | NS_100 |        |        |        |       |   |   |
| n7                | NS_01                                      | NS_46  |        |        |        |       |   |   |
| n8                | NS_01                                      | NS_100 | NS_43  | NS_43U |        |       |   |   |
| n12               | NS_01                                      | NS_06  |        |        |        |       |   |   |
| n13               | NS_01                                      | NS_06  | NS_07  |        |        |       |   |   |
| n14               | NS_01                                      | NS_06  |        |        |        |       |   |   |
| n18               | NS_01                                      | NS_100 |        |        |        |       |   |   |
| n20               | NS_01                                      | Void   | NS_10  |        |        |       |   |   |
| n24               | NS_01                                      | NS_56  |        |        |        |       |   |   |
| n25               | NS_01                                      | NS_100 | NS_03  | NS_03U |        |       |   |   |
| n26               | NS_01                                      | NS_100 | NS_12  | NS_13  | NS_14  | NS_15 |   |   |
| n28               | NS_01                                      | NS_17  | NS_18  |        |        |       |   |   |
| n30               | NS_01                                      | NS_21  |        |        |        |       |   |   |
| n34               | NS_01                                      |        |        |        |        |       |   |   |
| n38               | NS_01                                      | NS_44  |        |        |        |       |   |   |
| n39               | NS_01                                      | NS_50  |        |        |        |       |   |   |
| n40               | NS_01                                      |        |        |        |        |       |   |   |
| n41               | NS_01                                      | NS_04  | NS_47  |        |        |       |   |   |
| n48               | NS_01                                      | NS_27  |        |        |        |       |   |   |
| n50               | NS_01                                      | NS_41  | NS_42  |        |        |       |   |   |
| n51               | NS_01                                      | NS_40  |        |        |        |       |   |   |
| n53               | NS_01                                      | NS_45  |        |        |        |       |   |   |
| n65               | NS_01                                      | NS_24  | NS_100 | NS_05  | NS_05U | NS_51 |   |   |
| n66               | NS_01                                      | NS_100 | NS_03  | NS_03U |        |       |   |   |
| n70               | NS_01                                      | NS_03  |        |        |        |       |   |   |
| n71               | NS_01                                      | NS_35  |        |        |        |       |   |   |
| n74               | NS_01                                      | NS_37  | NS_38  | NS_39  |        |       |   |   |
| n77               | NS_01                                      | NS_55  | NS_57  |        |        |       |   |   |
| n78               | NS_01                                      |        |        |        |        |       |   |   |
| n79               | NS_01                                      |        |        |        |        |       |   |   |
| n80               | NS_01                                      | NS_100 |        |        |        |       |   |   |
| n81               | NS_01                                      | NS_100 | NS_43  | NS_43U |        |       |   |   |
| n82               | NS_01                                      | Void   | NS_10  |        |        |       |   |   |
| n83               | NS_01                                      | NS_17  | NS_18  |        |        |       |   |   |
| n84               | NS_01                                      | NS_100 | NS_05  | NS_05U | NS_48  | NS_49 |   |   |
| n85               | NS_01                                      | NS_06  |        |        |        |       |   |   |
| n86               | NS_01                                      | NS_100 | NS_03  | NS_03U |        |       |   |   |
| n89               | NS_01                                      | NS_100 |        |        |        |       |   |   |
| n90               | NS_01                                      | NS_04  |        |        |        |       |   |   |
| n91               | NS_01                                      |        |        |        |        |       |   |   |
| n92               | NS_01                                      |        |        |        |        |       |   |   |
| n93               | NS_01                                      |        |        |        |        |       |   |   |
| n94               | NS_01                                      |        |        |        |        |       |   |   |
| n95               | NS_01                                      |        |        |        |        |       |   |   |
| n97               | NS_01                                      |        |        |        |        |       |   |   |
| n98               | NS_01                                      | NS_50  |        |        |        |       |   |   |
| n99               | NS_01                                      | NS_56  |        |        |        |       |   |   |
| n100              | NS_01                                      |        |        |        |        |       |   |   |
| n101              | NS_01                                      |        |        |        |        |       |   |   |
| n104 <sup>2</sup> | NS_01                                      |        |        |        |        |       |   |   |

NOTE 1: *additionalSpectrumEmission* corresponds to an information element of the same name defined in clause 6.3.2 of TS 38.331 [7].

NOTE 2: Additional emission requirements and associated network signalling for Band n104 are not defined in this version of the specification but may be forthcoming in the future.

**Table 6.2.3.1-2: A-MPR for NS\_100 (UTRA protection)**

| Modulation/Waveform |           | Outer (dB) |
|---------------------|-----------|------------|
| DFT-s-OFDM          | Pi/2 BPSK | $\leq 2$   |
|                     | QPSK      | $\leq 2$   |
|                     | 16 QAM    | $\leq 2.5$ |
|                     | 64 QAM    | $\leq 3$   |
|                     | 256 QAM   | $\leq 4.5$ |
| CP-OFDM             | QPSK      | $\leq 4$   |
|                     | 16 QAM    | $\leq 4$   |
|                     | 64 QAM    | $\leq 4$   |
|                     | 256 QAM   | $\leq 6.5$ |
| NOTE 1: Void        |           |            |
| NOTE 2: Void        |           |            |

### 6.2.3.2 A-MPR for NS\_04

For NS\_04, A-MPR is not added to MPR. Also, when NS\_04 is signalled, MPR shall be set to zero in the  $P_{\text{CMAX}}$  equations to avoid double counting MPR.

Allowed maximum power reduction is defined as  $\text{A-MPR} = \max(\text{MPR}, \text{A-MPR}')$ ,

Note that  $\text{A-MPR}' = 0$  dB means only MPR is applied,

where  $\text{A-MPR}'$  is defined as

```

if  $\text{RB}_{\text{start}} \leq f_{\text{start,max,IMD3}} / (12\text{-SCS})$  and  $\text{LCRB} \leq \text{AW}_{\text{max,IMD3}} / (12\text{-SCS})$  and  $F_{\text{C}} - \text{BW}_{\text{channel}}/2 < F_{\text{UL\_low}} + \text{offset}_{\text{IMD3}}$ ,
then
    the A-MPR' is defined according to Table 6.2.3.2-2 PC3_A2 relative to 23 dBm for power class 3,
    PC2_A4 relative to 26 dBm for power class 2, and PC1.5_A6 relative to 29 dBm for power class 1.5,
else,
if  $\text{RB}_{\text{start}} \leq \text{LCRB}/2 + \Delta_{\text{start}} / (12\text{-SCS})$  and  $\text{LCRB} \leq \text{AW}_{\text{max,regrowth}} / (12\text{-SCS})$  and  $F_{\text{C}} - \text{BW}_{\text{channel}}/2 < F_{\text{UL\_low}} + \text{offset}_{\text{regrowth}}$ ,
then
    the A-MPR' is defined according to Table 6.2.3.2-2 PC3_A1 relative to 23 dBm for power class 3,
    PC2_A3 relative to 26 dBm for power class 2, , and PC1.5_A5 relative to 29 dBm for power class 1.5,
else
    A-MPR' = 0 dB and apply MPR.

```

With the parameters defined in Table 6.2.3.2-1.

**Table 6.2.3.2-1: Parameters for region edges and frequency offsets**

| Parameter                                               | Symbol                            | Value                                                 |                                                       | Related condition                                                                                         |
|---------------------------------------------------------|-----------------------------------|-------------------------------------------------------|-------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
|                                                         |                                   | CP-OFDM                                               | DFT-s-OFDM                                            |                                                                                                           |
| Max allocation start in IMD3 region                     | $f_{\text{start,max,IMD3}}$       | $0.33 \text{ BW}_{\text{channel}}$                    |                                                       | $\text{RB}_{\text{start}} \leq f_{\text{start,max,IMD3}} / (12\text{SCS})$                                |
| Max allocation BW in IMD3 region                        | $\text{AW}_{\text{max,IMD3}}$     | 4 MHz                                                 |                                                       | $\text{LCRB} \leq \text{AW}_{\text{max,IMD3}} / (12\text{SCS})$                                           |
| Freq. offset required to avoid A-MPR in IMD3 region     | $\text{offset}_{\text{IMD3}}$     | $\text{BW}_{\text{channel}} - 6 \text{ MHz}$          |                                                       | $F_{\text{C}} - \text{BW}_{\text{channel}}/2 \geq F_{\text{UL\_low}} + \text{offset}_{\text{IMD3}}$       |
| Right edge of regrowth region                           | $\Delta_{\text{start}}$           | $0.08 \text{ BW}_{\text{channel}}$                    |                                                       | $\text{RB}_{\text{start}} \leq \text{LCRB}/2 + \Delta_{\text{start}} / (12\text{SCS})$                    |
| Max allocation BW in regrowth region                    | $\text{AW}_{\text{max,regrowth}}$ | 100 MHz                                               |                                                       | $\text{LCRB} \leq \text{Min}(\text{LCRB}_{\text{Max}}, \text{AW}_{\text{max,regrowth}} / (12\text{SCS}))$ |
| Freq. offset required to avoid A-MPR in regrowth region | $\text{offset}_{\text{regrowth}}$ | Max (10 MHz, $0.25 * \text{BW}_{\text{channel}}$ MHz) | Max (10 MHz, $0.45 * \text{BW}_{\text{channel}}$ MHz) | $F_{\text{C}} - \text{BW}_{\text{channel}}/2 \geq F_{\text{UL\_low}} + \text{offset}_{\text{regrowth}}$   |



Table 6.2.3.2-2: A-MPR' values Access

| Modulation/Waveform |           | A-MPR' (dB) |        |        |        |                       |                       |
|---------------------|-----------|-------------|--------|--------|--------|-----------------------|-----------------------|
|                     |           | PC3_A1      | PC3_A2 | PC2_A3 | PC2_A4 | PC1.5_A5 <sup>1</sup> | PC1.5_A6 <sup>1</sup> |
| DFT-s-OFDM          | Pi/2-BPSK | ≤ 3.5       | ≤ 3.5  | ≤ 3.5  | ≤ 5.5  | ≤ 5                   | ≤ 7                   |
|                     | QPSK      | ≤ 4         | ≤ 4    | ≤ 4.5  | ≤ 6    | ≤ 6                   | ≤ 7.5                 |
|                     | 16 QAM    | ≤ 4         | ≤ 4    | ≤ 5    | ≤ 6    | ≤ 6.5                 | ≤ 7.5                 |
|                     | 64 QAM    | ≤ 4         | ≤ 4.5  | ≤ 5    | ≤ 6.5  | ≤ 6.5                 | ≤ 8                   |
|                     | 256 QAM   | ≤ 4.5       | ≤ 6    | ≤ 6.5  | ≤ 8    | ≤ 8                   | ≤ 9.5                 |
| CP-OFDM             | QPSK      | ≤ 5.5       | ≤ 5.5  | ≤ 6.5  | ≤ 7.5  | ≤ 8                   | ≤ 9                   |
|                     | 16 QAM    | ≤ 5.5       | ≤ 5.5  | ≤ 6.5  | ≤ 7.5  | ≤ 8                   | ≤ 9                   |
|                     | 64 QAM    | ≤ 5.5       | ≤ 5.5  | ≤ 6.5  | ≤ 7.5  | ≤ 8                   | ≤ 9                   |
|                     | 256 QAM   | ≤ 6.5       | ≤ 8    | ≤ 7.5  | ≤ 10   | ≤ 9                   | ≤ 11.5                |

NOTE 1: PC1.5 assumes 2Tx.

### 6.2.3.3 A-MPR for NS<sub>10</sub>

Table 6.2.3.3-1: A-MPR for NS<sub>10</sub>

| Channel bandwidth (MHz) | Parameters             | Region A |
|-------------------------|------------------------|----------|
| 15                      | RB <sub>start</sub>    | 0 – 10   |
|                         | L <sub>CRB</sub> (RBs) | 1 – 20   |
|                         | A (dB)                 | ≤ 3      |
| 20                      | RB <sub>start</sub>    | 0 – 15   |
|                         | L <sub>CRB</sub> (RBs) | 1 – 20   |
|                         | A (dB)                 | ≤ 6      |

NOTE 1: RB<sub>start</sub> indicates the lowest RB index of transmitted resource blocks

NOTE 2: L<sub>CRB</sub> is the length of a contiguous resource block allocation

NOTE 3: For intra-subframe frequency hopping which intersects Region A, notes 1 and 2 apply on a per slot basis. For intra-slot or intra-subslot frequency hopping which intersects Region A, notes 1 and 2 apply on a T<sub>no\_hopping</sub> basis.

NOTE 4: For intra-subframe frequency hopping which intersect Region A, the larger A-MPR value may be applied for both slots in the subframe. For intra-slot frequency hopping which intersects Region A, the larger A-MPR value may be applied for the slot. For intra-subslot frequency hopping which intersects Region A, the larger A-MPR value may be applied for the subslot.

NOTE 5: The A-MPR for DFT-s-OFDM is the total backoff and is obtained by taking the maximum value of MPR + A-MPR specified in Table 6.2.3-1 and Table 6.2.4-1 in TS 36.101 and A value specified in Table 6.2.3.3-1.

NOTE 6: The A-MPR for CP-OFDM is the total backoff and is obtained by adding the A value in Table 6.2.3.3-1 to the corresponding MPR specified in Table 6.2.2-1.

### 6.2.3.4 A-MPR for NS<sub>05</sub> and NS<sub>05U</sub>

Table 6.2.3.4-1: A-MPR regions for NS\_05 and NS\_05U (Power Class 3)

| Channel Bandwidth (MHz)                                                              | Carrier Centre Frequency, $F_c$ (MHz) | Region A                       |                             |       | Region B                                                      |                            |       | Region C                        |                                |       |
|--------------------------------------------------------------------------------------|---------------------------------------|--------------------------------|-----------------------------|-------|---------------------------------------------------------------|----------------------------|-------|---------------------------------|--------------------------------|-------|
|                                                                                      |                                       | $RB_{start}$                   | $L_{CRB}$                   | A-MPR | $RB_{start}$                                                  | $L_{CRB}$                  | A-MPR | $RB_{start}$                    | $L_{CRB}$                      | A-MPR |
| 5                                                                                    | $1922.5 \leq F_c < 1927.5$            | $< 1.62 \text{ MHz/12/SCS}$    | $> 2.52 \text{ MHz/12/SCS}$ | A3    |                                                               |                            |       |                                 |                                |       |
| 10                                                                                   | $1925 \leq F_c < 1935$                | $\leq 1.62 \text{ MHz/12/SCS}$ | $> 0$                       | A1    | $> 1.62 \text{ MHz/12/SCS}$<br>$\leq 3.60 \text{ MHz/12/SCS}$ | $> 5.4 \text{ MHz/12/SCS}$ | A7    | $\geq 7.2 \text{ MHz/12/SCS}$   | $\leq 1.08 \text{ MHz/12/SCS}$ | A2    |
| 10                                                                                   | $1935 \leq F_c < 1945$                |                                | $> 4.5 \text{ MHz/12/SCS}$  | A4    |                                                               |                            |       |                                 |                                |       |
| 15                                                                                   | $1927.5 \leq F_c < 1932.5$            | $\leq 3.24 \text{ MHz/12/SCS}$ | $> 0$                       | A1    | $> 3.24 \text{ MHz/12/SCS}$<br>$\leq 5.40 \text{ MHz/12/SCS}$ | $> 8.1 \text{ MHz/12/SCS}$ | A7    | $\geq 10.08 \text{ MHz/12/SCS}$ | $\leq 1.08 \text{ MHz/12/SCS}$ | A2    |
| 15                                                                                   | $1932.5 \leq F_c < 1942.5$            | $< 1.62 \text{ MHz/12/SCS}$    | $> 0$                       | A1    |                                                               |                            |       | $\geq 12.24 \text{ MHz/12/SCS}$ | $\leq 1.08 \text{ MHz/12/SCS}$ | A2    |
| 15                                                                                   | $1942.5 \leq F_c < 1947.5$            |                                | $> 7.2 \text{ MHz/12/SCS}$  | A5    |                                                               |                            |       |                                 |                                |       |
| 20                                                                                   | $1930 \leq F_c < 1950$                | $\leq 4.86 \text{ MHz/12/SCS}$ | $> 0$                       | A1    | $> 4.86 \text{ MHz/12/SCS}$<br>$\leq 7.20 \text{ MHz/12/SCS}$ | $> 9.0 \text{ MHz/12/SCS}$ | A7    | $\geq 13.68 \text{ MHz/12/SCS}$ | $\leq 1.08 \text{ MHz/12/SCS}$ | A2    |
| 20                                                                                   | $1950 \leq F_c < 1960$                |                                | $> 9.0 \text{ MHz/12/SCS}$  | A6    |                                                               |                            |       |                                 |                                |       |
| NOTE 1: The A-MPR values are specified in Table 6.2.3.4-2, 6.2.3.4-3 and 6.2.3.4-10. |                                       |                                |                             |       |                                                               |                            |       |                                 |                                |       |
| NOTE 2: Void                                                                         |                                       |                                |                             |       |                                                               |                            |       |                                 |                                |       |

Table 6.2.3.4-2: A-MPR for NS\_05 and NS\_05U (Power Class 3)

| Modulation/Waveform |           | A1 (dB)     | A2 (dB)     | A3 (dB) |  |
|---------------------|-----------|-------------|-------------|---------|--|
|                     |           | Outer/Inner | Outer/Inner | Outer   |  |
| DFT-s-OFDM          | Pi/2 BPSK | ≤ 10        | ≤ 5         | ≤ 4     |  |
|                     | QPSK      | ≤ 10        | ≤ 5         | ≤ 4.5   |  |
|                     | 16 QAM    | ≤ 10        | ≤ 5         | ≤ 6     |  |
|                     | 64 QAM    | ≤ 11        | ≤ 5         | ≤ 6     |  |
|                     | 256 QAM   | ≤ 13        | ≤ 5         | ≤ 7     |  |
| CP-OFDM             | QPSK      | ≤ 10        | ≤ 5         | ≤ 7.5   |  |
|                     | 16 QAM    | ≤ 10        | ≤ 5         | ≤ 7.5   |  |
|                     | 64 QAM    | ≤ 11        | ≤ 5         | ≤ 8     |  |
|                     | 256 QAM   | ≤ 13        |             | ≤ 10    |  |
| NOTE 1: Void        |           |             |             |         |  |
| NOTE 2: Void        |           |             |             |         |  |

Table 6.2.3.4-3: A-MPR for NS\_05 (Power Class 3)

| Modulation/Waveform |           | A4 (dB) |       | A5 (dB) |  | A6 (dB) |       | A7 (dB)     |
|---------------------|-----------|---------|-------|---------|--|---------|-------|-------------|
|                     |           | Outer   | Inner | Outer   |  | Outer   | Inner | Outer/Inner |
| DFT-s-OFDM          | Pi/2 BPSK | ≤ 1     | N/A   | ≤ 1     |  | ≤ 1     |       | ≤ 6         |
|                     | QPSK      |         |       | ≤ 1.5   |  | ≤ 1.5   |       | ≤ 6         |
|                     | 16 QAM    |         |       |         |  |         |       | ≤ 6         |
|                     | 64 QAM    |         |       |         |  |         |       | ≤ 6         |
|                     | 256 QAM   |         |       |         |  |         |       | ≤ 6         |
| CP-OFDM             | QPSK      | ≤ 3.5   |       | ≤ 3.5   |  | ≤ 3.5   |       | ≤ 6         |
|                     | 16 QAM    | ≤ 3.5   |       | ≤ 3.5   |  | ≤ 3.5   |       | ≤ 6         |
|                     | 64 QAM    |         |       |         |  |         |       | ≤ 6         |
|                     | 256 QAM   |         |       |         |  |         |       | ≤ 6         |
| NOTE 1: Void        |           |         |       |         |  |         |       |             |
| NOTE 2: Void        |           |         |       |         |  |         |       |             |

Table 6.2.3.4-4 - Table 6.2.3.4-9: Void

Table 6.2.3.4-10: A-MPR for modulation and waveform type for NS\_05U (Power Class 3)

| Modulation/Waveform |           | A4 (dB) |       | A5 (dB) | A6 (dB) |       | A7 (dB)     |
|---------------------|-----------|---------|-------|---------|---------|-------|-------------|
|                     |           | Outer   | Inner | Outer   | Outer   | Inner | Outer/Inner |
| DFT-s-OFDM          | Pi/2 BPSK | ≤ 2     | N/A   | ≤ 2     | ≤ 2     | N/A   | ≤ 6         |
|                     | QPSK      | ≤ 2     |       | ≤ 2     | ≤ 2     |       | ≤ 6         |
|                     | 16 QAM    | ≤ 2.5   |       | ≤ 2.5   | ≤ 2.5   |       | ≤ 6         |
|                     | 64 QAM    | ≤ 3     |       | ≤ 3     | ≤ 3     |       | ≤ 6         |
|                     | 256 QAM   | ≤ 4.5   |       | ≤ 4.5   | ≤ 4.5   |       | ≤ 6         |
| CP-OFDM             | QPSK      | ≤ 4     |       | ≤ 4     | ≤ 4     |       | ≤ 6         |
|                     | 16 QAM    | ≤ 4     |       | ≤ 4     | ≤ 4     |       | ≤ 6         |
|                     | 64 QAM    | ≤ 4     |       | ≤ 4     | ≤ 4     |       | ≤ 6         |
|                     | 256 QAM   | ≤ 6.5   |       | ≤ 6.5   | ≤ 6.5   |       | ≤ 6.5       |
| NOTE 1: Void        |           |         |       |         |         |       |             |
| NOTE 2: Void        |           |         |       |         |         |       |             |

Table 6.2.3.4-11: A-MPR regions for NS\_05 and NS\_05U (Power Class 2)

| Channel Bandwidth (MHz) | Carrier Centre Frequency, $F_c$ (MHz) | Region A            |                     |       | Region B                          |                                         |       | Region C                |                        |       |
|-------------------------|---------------------------------------|---------------------|---------------------|-------|-----------------------------------|-----------------------------------------|-------|-------------------------|------------------------|-------|
|                         |                                       | $RB_{start}$        | $L_{CRB}$           | A-MPR | $RB_{start}$                      | $L_{CRB}$                               | A-MPR | $RB_{start}$            | $L_{CRB}$              | A-MPR |
| 5                       | $1922.5 \leq F_c < 1927.5$            | $< 1.98$ MHz/12/SCS | $> 1.44$ MHz/12/SCS | A3    | $< 0.72$ MHz/12/SCS               | $\leq 1.44$ MHz/12/SCS                  | A4    |                         |                        |       |
| 10                      | $1925 \leq F_c < 1935$                | $< 1.98$ MHz/12/SCS | $> 0$               | A1    | $\geq 1.98$ MHz/12/SCS            | $> \max(0, RB_{start}-1.08$ MHz/12/SCS) | A7    | $\geq 7.2$ MHz/12/SCS   | $\leq 1.08$ MHz/12/SCS | A1    |
|                         |                                       |                     |                     |       | $\geq 1.98, \leq 2.7$ MHz/12/SCS  | $< 1.08$ MHz/12/SCS                     | A8    |                         |                        |       |
| 10                      | $1935 \leq F_c < 1945$                |                     | $> 3.96$ MHz/12/SCS | A4    |                                   |                                         |       |                         |                        |       |
| 15                      | $1927.5 \leq F_c < 1932.5$            | $< 3.6$ MHz/12/SCS  | $> 0$               | A1    | $\geq 3.6$ MHz/12/SCS             | $> \max(0, RB_{start}-1.8$ MHz/12/SCS)  | A7    | $\geq 10.08$ MHz/12/SCS | $\leq 1.08$ MHz/12/SCS | A1    |
|                         |                                       |                     |                     |       | $\geq 3.6, \leq 4.68$ MHz/12/SCS  | $\leq 1.08$ MHz/12/SCS                  | A8    |                         |                        |       |
| 15                      | $1932.5 \leq F_c < 1942.5$            | $< 1.98$ MHz/12/SCS | $> 0$               | A1    | $\geq 1.98$ MHz/12/SCS            | $> \max(0, RB_{start}+1.08$ MHz/12/SCS) | A7    | $\geq 12.24$ MHz/12/SCS | $\leq 1.08$ MHz/12/SCS | A1    |
| 15                      | $1942.5 \leq F_c < 1947.5$            |                     | $> 5.04$ MHz/12/SCS | A5    |                                   |                                         |       |                         |                        |       |
| 20                      | $1930 \leq F_c < 1950$                | $< 5.04$ MHz/12/SCS | $> 0$               | A1    | $\geq 5.04$ MHz/12/SCS            | $> \max(0, RB_{start}-3.6$ MHz/12/SCS)  | A7    | $\geq 13.68$ MHz/12/SCS | $\leq 1.08$ MHz/12/SCS | A1    |
|                         |                                       |                     |                     |       | $\geq 5.04, \leq 6.66$ MHz/12/SCS | $\leq 1.08$ MHz/12/SCS                  | A8    |                         |                        |       |
| 20                      | $1950 \leq F_c < 1960$                |                     | $> 9.0$ MHz/12/SCS  | A6    |                                   |                                         |       |                         |                        |       |

NOTE 1: The A-MPR values are specified in Table 6.2.3.4-12 and 6.2.3.4-13.

NOTE 2: Void

Table 6.2.3.4-12: A-MPR for NS\_05 and NS\_05U (Power Class 2)

| Modulation/Waveform |           | A1 (dB)     | A2 (dB)     | A3 (dB) |       |
|---------------------|-----------|-------------|-------------|---------|-------|
|                     |           | Outer/Inner | Outer/Inner | Outer   | Inner |
| DFT-s-OFDM          | Pi/2 BPSK | ≤ [13]      | ≤ 6         | ≤ 6.5   | ≤ 2   |
|                     | QPSK      | ≤ [13]      | ≤ 6         | ≤ 7     | ≤ 2   |
|                     | 16 QAM    | ≤ [13]      | ≤ 6         | ≤ 8.5   | ≤ 2   |
|                     | 64 QAM    | ≤ [14]      | ≤ 6         | ≤ 9     | ≤ 2   |
|                     | 256 QAM   | ≤ [15]      | ≤ 6         | ≤ 9.5   |       |
| CP-OFDM             | QPSK      | ≤ [13]      | ≤ 6         | ≤ 10    | ≤ 4   |
|                     | 16 QAM    | ≤ [13]      | ≤ 6         | ≤ 10    | ≤ 4   |
|                     | 64 QAM    | ≤ [14]      | ≤ 6         | ≤ 10    | ≤ 4   |
|                     | 256 QAM   | ≤ [16]      |             | ≤ 10    |       |
| NOTE 1: Void        |           |             |             |         |       |
| NOTE 2: Void        |           |             |             |         |       |

Table 6.2.3.4-13: A-MPR for NS\_05 and NS\_05U (Power Class 2)

| Modulation/Waveform |           | A4 (dB) |       | A5 (dB) |       | A6 (dB) |       | A7 (dB)     | A8 (dB)     |
|---------------------|-----------|---------|-------|---------|-------|---------|-------|-------------|-------------|
|                     |           | Outer   | Inner | Outer   | Inner | Outer   | Inner | Outer/Inner | Outer/Inner |
| DFT-s-OFDM          | Pi/2 BPSK | ≤ 3     | N/A   | ≤ 2     |       | ≤ 2     | N/A   | ≤ 8         | ≤ 3.5       |
|                     | QPSK      | ≤ 3     |       | ≤ 2     |       | ≤ 2     |       | ≤ 8         | ≤ 3.5       |
|                     | 16 QAM    | ≤ 3.5   |       | ≤ 2.5   |       | ≤ 2     |       | ≤ 8         | ≤ 3.5       |
|                     | 64 QAM    | ≤ 3.5   |       | ≤ 2.5   |       |         |       | ≤ 8         | ≤ 3.5       |
|                     | 256 QAM   |         |       |         |       |         |       | ≤ 8         |             |
| CP-OFDM             | QPSK      | ≤ 4.5   |       | ≤ 4.5   |       | ≤ 4     |       | ≤ 8.5       | ≤ 3.5       |
|                     | 16 QAM    | ≤ 4.5   |       | ≤ 4.5   |       | ≤ 4     |       | ≤ 8.5       | ≤ 3.5       |
|                     | 64 QAM    | ≤ 5     |       | ≤ 5     | ≤ 5   | ≤ 4     |       | ≤ 8.5       |             |
|                     | 256 QAM   |         |       |         |       |         |       | ≤ 8.5       |             |
| NOTE 1: Void        |           |         |       |         |       |         |       |             |             |
| NOTE 2: Void        |           |         |       |         |       |         |       |             |             |

## 6.2.3.5 A-MPR for NS\_40

Table 6.2.3.5-1: A-MPR for NS\_40

| Modulation/ Waveform                                                                                                                                                                                                                |         | A (dB)                   |       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|--------------------------|-------|
|                                                                                                                                                                                                                                     |         | Channel bandwidth: 5 MHz |       |
|                                                                                                                                                                                                                                     |         | Outer                    | Inner |
| DFT-s-OFDM                                                                                                                                                                                                                          | QPSK    | ≤ 15.5                   | ≤ 12  |
|                                                                                                                                                                                                                                     | 16 QAM  | ≤ 14.5                   | ≤ 11  |
|                                                                                                                                                                                                                                     | 64 QAM  | ≤ 14.5                   | ≤ 10  |
|                                                                                                                                                                                                                                     | 256 QAM | ≤ 12.5                   | ≤ 7.5 |
| CP-OFDM                                                                                                                                                                                                                             | QPSK    | ≤ 14.5                   | ≤ 10  |
|                                                                                                                                                                                                                                     | 16 QAM  | ≤ 14.5                   | ≤ 10  |
|                                                                                                                                                                                                                                     | 64 QAM  | ≤ 14                     | ≤ 8   |
|                                                                                                                                                                                                                                     | 256 QAM | ≤ 11                     | ≤ 5.5 |
| NOTE 1: The A-MPR for NS_40 is the total backoff and is obtained by taking the maximum value of MPR + A-MPR specified in Table 6.2.3-1 and Table 6.2.4-30a in TS 36.101 and MPR + A specified in Table 6.2.2-1 and Table 6.2.3.5-1. |         |                          |       |

## 6.2.3.6 A-MPR for NS\_43 and NS\_43U

Table 6.2.3.6-1: A-MPR regions for NS\_43

| Channel Bandwidth (MHz) | Carrier Centre Frequency, Fc (MHz) | Region A            |      |       | Region B            |      |       |
|-------------------------|------------------------------------|---------------------|------|-------|---------------------|------|-------|
|                         |                                    | RB <sub>start</sub> | LCRB | A-MPR | RB <sub>start</sub> | LCRB | A-MPR |

|        |                          |                    |      |    |                                       |                       |    |
|--------|--------------------------|--------------------|------|----|---------------------------------------|-----------------------|----|
| 5 MHz  | $902.5 \leq F_c < 912.5$ |                    | > 15 | A1 |                                       |                       |    |
| 10 MHz | $F_c = 910$              |                    | > 40 | A2 |                                       | > 5.4 MHz/12/SCS      | A4 |
|        |                          |                    | > 45 | A3 |                                       | > 7.2 MHz/12/SCS      | A5 |
| 15 MHz | $F_c = 907.5$            | < 1.8 MHz /12/SCS  | > 0  | A6 | > 1.8 MHz/12/SCS<br>< 6.12 MHz/12/SCS | $\geq 7.2$ MHz/12/SCS | A6 |
|        |                          | > 12.24 MHz/12/SCS | > 0  | A6 |                                       |                       |    |

NOTE 1: The A-MPR values are specified in Table 6.2.3.6-2.  
NOTE 2: 15 kHz SCS unless otherwise stated  
NOTE 3: Void

Table 6.2.3.6-2: A-MPR for NS\_43

| Modulation/Waveform |           | A1 (dB)    |       | A2 (dB)    |       | A3 (dB)    |       | A4 (dB)    |       | A5 (dB)    |       | A6 (dB)       |
|---------------------|-----------|------------|-------|------------|-------|------------|-------|------------|-------|------------|-------|---------------|
|                     |           | Outer      | Inner | Outer      | Inner | Outer      | Inner | Outer      | Inner | Outer      | Inner | Outer / Inner |
| DFT-s-OFDM          | Pi/2 BPSK |            | N/A   | $\leq 1.5$ | N/A   |            |       |            | N/A   |            | N/A   | $\leq 9$      |
|                     | QPSK      | $\leq 2$   |       |            |       |            |       | $\leq 2.5$ |       |            |       | $\leq 9$      |
|                     | 16 QAM    |            |       |            |       |            |       |            |       | $\leq 2.5$ |       | $\leq 9$      |
|                     | 64 QAM    |            |       |            |       | $\leq 2.5$ |       |            |       |            |       | $\leq 9$      |
|                     | 256 QAM   |            |       |            |       |            |       |            |       |            |       | $\leq 9$      |
| CP-OFDM             | QPSK      | $\leq 3.5$ |       |            |       |            |       |            |       | $\leq 4$   |       | $\leq 9$      |
|                     | 16 QAM    | $\leq 3.5$ |       |            |       |            |       |            |       | $\leq 4$   |       | $\leq 9$      |
|                     | 64 QAM    |            |       |            |       | $\leq 4$   |       |            |       |            |       | $\leq 9$      |
|                     | 256 QAM   |            |       |            |       |            |       |            |       |            |       | $\leq 9$      |

Table 6.2.3.6-3: Void

When NS\_43U is signalled for 5 and 10 MHz channel bandwidths A-MPR is defined in Table 6.2.3.1-2 except for DFT-s-OFDM QPSK when  $L_{CRB} > 5.4$  MHz/12/SCS the A-MPR is 2.5 dB. For 15 MHz channel bandwidth Table 6.2.3.6-4 applies.

Table 6.2.3.6-4: A-MPR for NS\_43U

| Modulation/Waveform |           | 15 MHz<br>Outer / Inner (dB) |
|---------------------|-----------|------------------------------|
| DFT-s-OFDM          | Pi/2 BPSK | $\leq 9$                     |
|                     | QPSK      | $\leq 9$                     |
|                     | 16 QAM    | $\leq 9$                     |
|                     | 64 QAM    | $\leq 9$                     |
|                     | 256 QAM   | $\leq 9$                     |
| CP-OFDM             | QPSK      | $\leq 9$                     |
|                     | 16 QAM    | $\leq 9$                     |
|                     | 64 QAM    | $\leq 9$                     |
|                     | 256 QAM   | $\leq 9$                     |

### 6.2.3.7 A-MPR for NS\_03 and NS\_03U

Table 6.2.3.7-1 A-MPR for NS\_03

Table 6.2.3.7-1 A-MPR for NS\_03

| Modulation/Waveform | Outer (dB) | Inner (dB) |
|---------------------|------------|------------|
|---------------------|------------|------------|

|              |              |       |     |
|--------------|--------------|-------|-----|
| DFT-s-OFDM   | PI/2<br>BPSK | ≤ 1.5 | N/A |
|              | QPSK         | ≤ 2   |     |
|              | 16<br>QAM    | ≤ 3   |     |
|              | 64<br>QAM    | ≤ 3.5 |     |
|              | 256<br>QAM   | ≤ 5.5 |     |
| CP-OFDM      | QPSK         | ≤ 4   |     |
|              | 16<br>QAM    | ≤ 4   |     |
|              | 64<br>QAM    | ≤ 4.5 |     |
|              | 256<br>QAM   | ≤ 7.5 |     |
| NOTE 1: Void |              |       |     |
| NOTE 2: Void |              |       |     |

In case UE operates in a band where NS\_03U applies and it receives *additionalSpectrumEmission* value of 3 then A-MPR values specified in Table 6.2.3.7-1 apply with an exception that DFT-s-OFDM Pi/2 BPSK A-MPR is 2 dB.

### 6.2.3.8 A-MPR for NS\_37

**Table 6.2.3.8-1: A-MPR regions for B11/B21 protection (NS\_37) (1447.9 - 1462.9 MHz)**

| Channel Bandwidth (MHz)                                    | Carrier Centre Frequency, $F_c$ (MHz) | Region A (Outer/Inner) |                    |           | Region B (Outer/Inner) |                     |           | Region C (Outer/Inner) |                     |           |
|------------------------------------------------------------|---------------------------------------|------------------------|--------------------|-----------|------------------------|---------------------|-----------|------------------------|---------------------|-----------|
|                                                            |                                       | RB <sub>start</sub>    | LCRB               | A-MPR     | RB <sub>start</sub>    | LCRB                | A-MPR     | RB <sub>start</sub>    | LCRB                | A-MPR     |
| 10                                                         | $1452.9 < F_c \leq 1457.9$            | $\geq 0$               | $> 7.2$ MHz/12/SCS | $\leq A1$ | N/A                    | N/A                 | N/A       | N/A                    | N/A                 | N/A       |
| 15                                                         | $F_c = 1455.4$                        | $\geq 0$               | $> 9.9$ MHz/12/SCS | $\leq A1$ | $< 0.54$ MHz/12/SCS    | $< 1.08$ MHz/12/SCS | $\leq A2$ | $> 13.86$ MHz/12/SCS   | $< 1.08$ MHz/12/SCS | $\leq A2$ |
| NOTE 1: The A-MPR values are specified in Table 6.2.3.8-2  |                                       |                        |                    |           |                        |                     |           |                        |                     |           |
| NOTE 2: Void                                               |                                       |                        |                    |           |                        |                     |           |                        |                     |           |
| NOTE 3: Void                                               |                                       |                        |                    |           |                        |                     |           |                        |                     |           |
| NOTE 4: No A-MPR for SCS = 60 kHz for region B and C only. |                                       |                        |                    |           |                        |                     |           |                        |                     |           |

**Table 6.2.3.8-2: A-MPR for NS\_37**

| Modulation/Waveform |           | A1 (dB) |       | A2 (dB)     |
|---------------------|-----------|---------|-------|-------------|
|                     |           | Outer   | Inner | Outer/Inner |
| DFT-s-OFDM          | Pi/2 BPSK | ≤ 1     | N/A   | ≤ 3         |
|                     | QPSK      | ≤ 1.5   |       | ≤ 3         |
|                     | 16 QAM    | ≤ 2.5   |       | ≤ 3         |
|                     | 64 QAM    | ≤ 3     |       | ≤ 3         |
|                     | 256 QAM   |         |       |             |
| CP-OFDM             | QPSK      | ≤ 3.5   |       | ≤ 3         |
|                     | 16 QAM    | ≤ 3.5   |       | ≤ 3         |
|                     | 64 QAM    |         |       |             |
|                     | 256 QAM   |         |       |             |
| NOTE 1: Void        |           |         |       |             |
| NOTE 2: Void        |           |         |       |             |

## 6.2.3.9 A-MPR for NS\_38

Table 6.2.3.9-1: A-MPR for EESS (NS\_38) Protection (1430 – 1470 MHz)

| Channel Bandwidth (MHz) | Carrier Centre Frequency, $F_c$ (MHz) | Region A Outer/Inner            |                       |            | Region B Outer/Inner         |                        |            |
|-------------------------|---------------------------------------|---------------------------------|-----------------------|------------|------------------------------|------------------------|------------|
|                         |                                       | $RB_{start}$                    | $LCRB$                | A-MPR (dB) | $RB_{start}$                 | $RB_{start}+LCRB$      | A-MPR (dB) |
| 5                       | $1432.5 \leq F_c < 1437.5$            | $\leq -3.6$ MHz/12/SCS + $LCRB$ | $\geq 3.6$ MHz/12/SCS | $\leq 7$   | $> -3.6$ MHz/12/SCS + $LCRB$ | $\leq 2.16$ MHz/12/SCS | $\leq 5.5$ |
| 10                      | $1435 \leq F_c < 1442$                | $\leq -3.6$ MHz/12/SCS + $LCRB$ | $\geq 3.6$ MHz/12/SCS | $\leq 12$  | $> -3.6$ MHz/12/SCS + $LCRB$ | $\leq 2.16$ MHz/12/SCS | $\leq 9$   |
| 15                      | $1437.5 \leq F_c < 1447.5$            | $\leq -3.6$ MHz/12/SCS + $LCRB$ | $\geq 3.6$ MHz/12/SCS | $\leq 13$  | $> -3.6$ MHz/12/SCS + $LCRB$ | $\leq 3.6$ MHz/12/SCS  | $\leq 10$  |
| 20                      | $1440 \leq F_c < 1450$                | $\leq -3.6$ MHz/12/SCS + $LCRB$ | $\geq 3.6$ MHz/12/SCS | $\leq 13$  | $> -3.6$ MHz/12/SCS + $LCRB$ | $\leq 5.4$ MHz/12/SCS  | $\leq 10$  |
| NOTE 1 - 4: Void        |                                       |                                 |                       |            |                              |                        |            |

## 6.2.3.10 A-MPR for NS\_39

Table 6.2.3.10-1: A-MPR for own RX (NS\_39) Protection (1440 – 1470 MHz)

| Channel Bandwidth, MHz | Carrier Centre Frequency, $F_c$ , MHz | Region A (Outer/Inner) |            |
|------------------------|---------------------------------------|------------------------|------------|
|                        |                                       | $RB_{start}+LCRB$      | A-MPR (dB) |
| 10                     | $1462 < F_c \leq 1465$                | $> 7.9$ MHz/12/SCS     | $\leq 6$   |
| 15                     | $1456.3 < F_c \leq 1462.5$            | $> 11.2$ MHz/12/SCS    | $\leq 6$   |
| 20                     | $1450.8 < F_c \leq 1460$              | $> 12.6$ MHz/12/SCS    | $\leq 6$   |
| NOTE 1 - 4: Void       |                                       |                        |            |

## 6.2.3.11 A-MPR for NS\_41

Table 6.2.3.11-1: A-MPR for NS\_41

| Channel Bandwidth (MHz) | Carrier Centre Frequency, $F_c$ (MHz) | Region A Outer/Inner            |                    |             | Region B Outer/Inner |             |
|-------------------------|---------------------------------------|---------------------------------|--------------------|-------------|----------------------|-------------|
|                         |                                       | $RB_{start}$                    | $LCRB$             | A-MPR (dB)  | $RB_{start}+LCRB$    | A-MPR (dB)  |
| 5                       | -                                     | -                               | -                  | -           | -                    | -           |
| 10                      | $1437 \leq F_c < 1442$                | $\leq -4.5$ MHz/12/SCS + $LCRB$ | $> 4.5$ MHz/12/SCS | $\leq 9$    | $< 1.8$ MHz/12/SCS   | $\leq 9$    |
| 15                      | $1439.5 \leq F_c < 1447.5$            | $\leq -5.4$ MHz/12/SCS + $LCRB$ | $> 5.4$ MHz/12/SCS | $\leq 11$   | $< 3.42$ MHz/12/SCS  | $\leq 9$    |
| 20                      | $1442 \leq F_c < 1450$                | $\leq -5.4$ MHz/12/SCS + $LCRB$ | $> 5.4$ MHz/12/SCS | $\leq 12$   | $< 5.04$ MHz/12/SCS  | $\leq 9$    |
| 30                      | $1452 \leq F_c < 1502$                | $\leq -7.2$ MHz/12/SCS + $LCRB$ | $> 7.2$ MHz/12/SCS | $\leq 13.5$ | $< 11.7$ MHz/12/SCS  | $\leq 13.5$ |
| 40                      | $1452 \leq F_c < 1497$                | $\leq -7.2$ MHz/12/SCS + $LCRB$ | $> 7.2$ MHz/12/SCS | $\leq 13.5$ | $< 11.7$ MHz/12/SCS  | $\leq 13.5$ |
| 50                      | $1457 \leq F_c < 1492$                | $\leq -7.2$ MHz/12/SCS + $LCRB$ | $> 7.2$ MHz/12/SCS | $\leq 13.5$ | $< 15.12$ MHz/12/SCS | $\leq 13.5$ |
| 60                      | $1462 \leq F_c < 1487$                | $\leq -7.2$ MHz/12/SCS + $LCRB$ | $> 7.2$ MHz/12/SCS | $\leq 13.5$ | $< 18.72$ MHz/12/SCS | $\leq 13.5$ |
| NOTE 1 - 4: Void        |                                       |                                 |                    |             |                      |             |



## 6.2.3.12 A-MPR for NS\_42

Table 6.2.3.12-1: A-MPR for NS\_42

| Channel Bandwidth (MHz) | Carrier Centre Frequency, $F_c$ (MHz) | Region A                               |                        | Region B                               |                                           |                  |                  |
|-------------------------|---------------------------------------|----------------------------------------|------------------------|----------------------------------------|-------------------------------------------|------------------|------------------|
|                         |                                       | $RB_{start}+LCRB$                      | A-MPR Outer/Inner (dB) | $RB_{start}$                           | $RB_{start}+LCRB$                         | A-MPR Inner (dB) | A-MPR Outer (dB) |
| 5                       | $1512 \leq F_c \leq 1514.5$           | $> 3.1 \text{ MHz} / 12 / \text{SCS}$  | $\leq 7$               | $< 0.90 \text{ MHz} / 12 / \text{SCS}$ | $\leq 3.1 \text{ MHz} / 12 / \text{SCS}$  | $\leq 1.5$       | $\leq 4$         |
| 10                      | $1497 \leq F_c \leq 1512$             | $> 6.2 \text{ MHz} / 12 / \text{SCS}$  | $\leq 8$               | $< 0.90 \text{ MHz} / 12 / \text{SCS}$ | $\leq 6.2 \text{ MHz} / 12 / \text{SCS}$  | $\leq 1.5$       | $\leq 5$         |
| 15                      | $1502 \leq F_c \leq 1509.5$           | $> 9.3 \text{ MHz} / 12 / \text{SCS}$  | $\leq 8$               | $< 3.06 \text{ MHz} / 12 / \text{SCS}$ | $\leq 9.3 \text{ MHz} / 12 / \text{SCS}$  | $\leq 1.5$       | $\leq 5$         |
| 20                      | $1497 \leq F_c \leq 1507$             | $> 12.4 \text{ MHz} / 12 / \text{SCS}$ | $\leq 8$               | $< 4.50 \text{ MHz} / 12 / \text{SCS}$ | $\leq 12.4 \text{ MHz} / 12 / \text{SCS}$ | $\leq 1.5$       | $\leq 5$         |
| 30                      | $1477 \leq F_c \leq 1502$             | $> 24.8 \text{ MHz} / 12 / \text{SCS}$ | $\leq 8$               | $< 5.40 \text{ MHz} / 12 / \text{SCS}$ | $\leq 24.8 \text{ MHz} / 12 / \text{SCS}$ | $\leq 1.5$       | $\leq 5$         |
| 40                      | $1477 \leq F_c \leq 1497$             | $> 24.8 \text{ MHz} / 12 / \text{SCS}$ | $\leq 8$               | $< 5.40 \text{ MHz} / 12 / \text{SCS}$ | $\leq 24.8 \text{ MHz} / 12 / \text{SCS}$ | $\leq 1.5$       | $\leq 5$         |
| 50                      | $1467 \leq F_c \leq 1492$             | $> 31 \text{ MHz} / 12 / \text{SCS}$   | $\leq 8$               | $< 7.20 \text{ MHz} / 12 / \text{SCS}$ | $\leq 31 \text{ MHz} / 12 / \text{SCS}$   | $\leq 1.5$       | $\leq 5$         |
| 60                      | $1462 \leq F_c \leq 1487$             | $> 37.2 \text{ MHz} / 12 / \text{SCS}$ | $\leq 8$               | $< 7.20 \text{ MHz} / 12 / \text{SCS}$ | $\leq 37.2 \text{ MHz} / 12 / \text{SCS}$ | $\leq 1.5$       | $\leq 5$         |

NOTE 1 - 5: Void

## 6.2.3.13 A-MPR for NS\_18

Table 6.2.3.13-0: Band n28 and n83 30MHz A-MPR regions for NS\_18

| Channel Bandwidth, MHz | Frequency range of UL transmission bandwidth configuration, MHz | Regions                                          |                                                                                                     | A-MPR |
|------------------------|-----------------------------------------------------------------|--------------------------------------------------|-----------------------------------------------------------------------------------------------------|-------|
|                        |                                                                 | $RB_{start} \cdot 12 \cdot \text{SCS}$ MHz       | $LCRB \cdot 12 \cdot \text{SCS}$ MHz                                                                |       |
| 25                     | 703~733                                                         | $> (LCRB \cdot 12 \cdot \text{SCS})/2 + 3.6$     | $\geq \text{Max}(0, 12 \cdot \text{SCS} \cdot N_{RB} - 1.8 - RB_{start} \cdot 12 \cdot \text{SCS})$ | A3    |
|                        |                                                                 | $\leq (LCRB \cdot 12 \cdot \text{SCS})/2 + 3.6$  | $\geq 5.4$                                                                                          | A4    |
|                        |                                                                 | $\leq 6.3$                                       | $< 5.4$                                                                                             | A5    |
| 30                     | 703~733                                                         | $> (LCRB \cdot 12 \cdot \text{SCS})/2 + 5.22$    | $\geq \text{Max}(0, 12 \cdot \text{SCS} \cdot N_{RB} - 1.8 - RB_{start} \cdot 12 \cdot \text{SCS})$ | A3    |
|                        |                                                                 | $\leq (LCRB \cdot 12 \cdot \text{SCS})/2 + 5.22$ | $\geq 5.4$                                                                                          | A4    |
|                        |                                                                 | $\leq 7.92$                                      | $< 5.4$                                                                                             | A5    |

Table 6.2.3.13-1: A-MPR for NS\_18

| Modulation/Waveform |           | A1 (dB)  |       | A2 (dB)     | A3 (dB)     | A4 (dB)     | A5 (dB)     |
|---------------------|-----------|----------|-------|-------------|-------------|-------------|-------------|
|                     |           | Outer    | Inner | Inner/Outer | Outer/Inner | Outer/Inner | Outer/Inner |
| DFT-s-OFDM          | Pi/2 BPSK | $\leq 2$ | N/A   | $\leq 5$    | 3           | 8           | 3           |
|                     | QPSK      | $\leq 2$ |       | $\leq 5$    | 3           | 8           | 3           |
|                     | 16 QAM    | $\leq 3$ |       | $\leq 6$    | 3           | 8           | 3           |
|                     | 64 QAM    | $\leq 4$ |       | $\leq 7$    | 3           | 8           | 4.5         |
|                     | 256 QAM   | $\leq 6$ |       | $\leq 9$    | 3           | 8           | 5.5         |
| CP-OFDM             | QPSK      | $\leq 5$ |       | $\leq 6.5$  | 4.5         | 9.5         | 5           |
|                     | 16 QAM    | $\leq 5$ |       | $\leq 7$    | 4.5         | 9.5         | 5           |

|              |         |            |  |             |     |     |     |
|--------------|---------|------------|--|-------------|-----|-----|-----|
|              | 64 QAM  | $\leq 5.5$ |  | $\leq 8.5$  | 4.5 | 9.5 | 5.5 |
|              | 256 QAM | $\leq 8.5$ |  | $\leq 11.5$ | 4.5 | 9.5 | 7.5 |
| NOTE 1: Void |         |            |  |             |     |     |     |
| NOTE 2: Void |         |            |  |             |     |     |     |

## 6.2.3.14 A-MPR for NS\_21

Table 6.2.3.14-1: A-MPR for "NS\_21"

| Channel Bandwidth (MHz) | Modulation/Waveform |           | Region A1a<br>$RB_{start} \leq 1.44\text{MHz}/12/\text{SCS}$<br>$LCRB \leq 0.54\text{MHz}/12/\text{SCS}$ | Region A1b<br>$RB_{start} \leq 1.44\text{MHz}/12/\text{SCS}$<br>$LCRB > 0.54\text{MHz}/12/\text{SCS}$<br>$LCRB \leq 2.16\text{MHz}/12/\text{SCS}$ | Region A2<br>$LCRB > 5.4\text{MHz}/12/\text{SCS}$ | Region A3b<br>$RB_{end} \geq 7.74\text{MHz}/12/\text{SCS}$<br>$LCRB > 0.54\text{MHz}/12/\text{SCS}$<br>$LCRB \leq 2.16\text{MHz}/12/\text{SCS}$ | Region A3a<br>$RB_{end} \geq 7.74\text{MHz}/12/\text{SCS}$<br>$LCRB \leq 0.54\text{MHz}/12/\text{SCS}$ |
|-------------------------|---------------------|-----------|----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
|                         |                     |           | Outer/Inner                                                                                              |                                                                                                                                                   | Outer                                             | Outer/Inner                                                                                                                                     |                                                                                                        |
| 10                      | DFT-s-OFDM          | PI/2 BPSK | 6                                                                                                        | 3                                                                                                                                                 | 4                                                 | 3                                                                                                                                               | 6                                                                                                      |
|                         |                     | QPSK      | 6                                                                                                        | 3                                                                                                                                                 | 4                                                 | 3                                                                                                                                               | 6                                                                                                      |
|                         |                     | 16 QAM    | 6                                                                                                        | 3                                                                                                                                                 | 4                                                 | 3                                                                                                                                               | 6                                                                                                      |
|                         |                     | 64 QAM    | 6                                                                                                        | 3                                                                                                                                                 | 4                                                 | 3                                                                                                                                               | 6                                                                                                      |
|                         |                     | 256 QAM   | 6                                                                                                        | 3                                                                                                                                                 | 4                                                 | 3                                                                                                                                               | 6                                                                                                      |
|                         | CP-OFDM             | QPSK      | 6                                                                                                        | 4                                                                                                                                                 | 5.5                                               | 4                                                                                                                                               | 6                                                                                                      |
|                         |                     | 16 QAM    | 6                                                                                                        | 4                                                                                                                                                 | 5.5                                               | 4                                                                                                                                               | 6                                                                                                      |
|                         |                     | 64 QAM    | 6                                                                                                        | 4                                                                                                                                                 | 5.5                                               | 4                                                                                                                                               | 6                                                                                                      |
|                         |                     | 256 QAM   | 6                                                                                                        | 4                                                                                                                                                 | 5.5                                               | 4                                                                                                                                               | 6                                                                                                      |

Table 6.2.3.14-2: A-MPR for "NS\_21"

| Channel Bandwidth (MHz) | Modulation/Waveform |           | Region A1a<br>$RB_{start} \leq 0.36\text{MHz}/12/\text{SCS}$<br>$LCRB \leq 0.72\text{MHz}/12/\text{SCS}$ | Region A1b<br>$RB_{start} \leq 0.36\text{MHz}/12/\text{SCS}$<br>$LCRB > 0.72\text{MHz}/12/\text{SCS}$<br>$LCRB \leq 2.52\text{MHz}/12/\text{SCS}$ | Region A2<br>$LCRB > 2.52\text{MHz}/12/\text{SCS}$ | Region A3b<br>$RB_{end} \geq 3.96\text{MHz}/12/\text{SCS}$<br>$LCRB > 0.72\text{MHz}/12/\text{SCS}$<br>$LCRB \leq 2.52\text{MHz}/12/\text{SCS}$ | Region A3a<br>$RB_{end} \geq 3.96\text{MHz}/12/\text{SCS}$<br>$LCRB \leq 0.72\text{MHz}/12/\text{SCS}$ | Region A4<br>$RB_{start} > 0.36\text{MHz}/12/\text{SCS}$<br>$RB_{end} < 3.96\text{MHz}/12/\text{SCS}$<br>$LCRB \leq 2.52\text{MHz}/12/\text{SCS}$ |
|-------------------------|---------------------|-----------|----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
|                         |                     |           | Outer/Inner                                                                                              |                                                                                                                                                   | Outer                                              | Outer/Inner                                                                                                                                     |                                                                                                        | Outer/Inner                                                                                                                                       |
| 5                       | DFT-s-OFDM          | PI/2 BPSK | $\leq 4.0$                                                                                               | $\leq 2.0$                                                                                                                                        | $\leq 1.5$                                         | $\leq 2.0$                                                                                                                                      | $\leq 4.0$                                                                                             | $\leq 3.0$                                                                                                                                        |
|                         |                     | QPSK      | $\leq 4.5$                                                                                               | $\leq 3.5$                                                                                                                                        | $\leq 3.0$                                         | $\leq 3.5$                                                                                                                                      | $\leq 4.5$                                                                                             | $\leq 3.0$                                                                                                                                        |
|                         |                     | 16 QAM    | $\leq 4.5$                                                                                               | $\leq 4.0$                                                                                                                                        | $\leq 3.5$                                         | $\leq 4.0$                                                                                                                                      | $\leq 4.5$                                                                                             | $\leq 3.5$                                                                                                                                        |
|                         |                     | 64 QAM    | $\leq 4.5$                                                                                               | $\leq 4.0$                                                                                                                                        | $\leq 3.5$                                         | $\leq 4.0$                                                                                                                                      | $\leq 4.5$                                                                                             | $\leq 3.5$                                                                                                                                        |
|                         |                     | 256 QAM   | $\leq 4.5$                                                                                               | $\leq 4.5$                                                                                                                                        | $\leq 4.5$                                         | $\leq 4.5$                                                                                                                                      | $\leq 4.5$                                                                                             | $\leq 4.5$                                                                                                                                        |
|                         | CP-OFDM             | QPSK      | $\leq 5.0$                                                                                               | $\leq 5.0$                                                                                                                                        | $\leq 5.0$                                         | $\leq 5.0$                                                                                                                                      | $\leq 5.0$                                                                                             | $\leq 4.5$                                                                                                                                        |
|                         |                     | 16 QAM    | 5.0                                                                                                      | $\leq 5.0$                                                                                                                                        | $\leq 5.0$                                         | $\leq 5.0$                                                                                                                                      | $\leq 5.0$                                                                                             | $\leq 4.5$                                                                                                                                        |
|                         |                     | 64 QAM    | $\leq 5.0$                                                                                               | $\leq 5.0$                                                                                                                                        | $\leq 5.0$                                         | $\leq 5.0$                                                                                                                                      | $\leq 5.0$                                                                                             | $\leq 4.5$                                                                                                                                        |

|  |  |         |            |            |            |            |            |            |
|--|--|---------|------------|------------|------------|------------|------------|------------|
|  |  | 256 QAM | $\leq 6.5$ | $\leq 6.5$ | $\leq 6.5$ | $\leq 6.5$ | $\leq 6.5$ | $\leq 6.5$ |
|--|--|---------|------------|------------|------------|------------|------------|------------|

6.2.3.15 A-MPR for NS<sub>24</sub>Table 6.2.3.15-1: A-MPR for NS<sub>24</sub>

| Channel Bandwidth, MHz | Carrier Centre Frequency, F <sub>c</sub> , MHz | Region A                       |                  |       | Region B                       |                  |       | Region C                       |                  |       |
|------------------------|------------------------------------------------|--------------------------------|------------------|-------|--------------------------------|------------------|-------|--------------------------------|------------------|-------|
|                        |                                                | RB <sub>end</sub> *12* SCS MHz | LCRB*12* SCS MHz | A-MPR | RB <sub>end</sub> *12*S CS MHz | LCRB*12* SCS MHz | A-MPR | RB <sub>end</sub> *12*S CS MHz | LCRB*12* SCS MHz | A-MPR |
| 5MHz                   | 1987.5 < F <sub>c</sub> ≤ 1992.5               |                                | >3.24            | A7    |                                |                  |       |                                |                  |       |
| 5MHz                   | 1992.5 < F <sub>c</sub> ≤ 1997.5               |                                | >3.24            | A4    |                                |                  |       |                                |                  |       |
| 5MHz                   | 1997.5 < F <sub>c</sub> ≤ 2002.5               |                                | >1.98            | A1    | >3.6                           | >1.08<br>≤1.98   | A2    | ≤3.6                           | ≤1.98            | A3    |
|                        |                                                |                                |                  |       |                                | ≤1.08            | A6    |                                |                  |       |
| 10MHz                  | 1975 < F <sub>c</sub> ≤ 1985                   | >5.4                           |                  | A4    |                                |                  |       |                                |                  |       |
| 10MHz                  | 1985 < F <sub>c</sub> ≤ 1995                   |                                | >4.32            | A1    | ≥7.2                           | >1.08<br>≤4.32   | A2    | <7.2                           | ≤4.32            | A3    |
|                        |                                                |                                |                  |       |                                | ≤1.08            | A6    |                                |                  |       |
| 10MHz                  | 1995 < F <sub>c</sub> ≤ 2000                   | ≥5.76                          |                  | A5    | <3.06                          |                  | A5    | ≥3.06<br><5.76                 | >1.44            | A6    |
| 15MHz                  | 1972.5 < F <sub>c</sub> ≤ 1987.5               |                                | >6.84            | A1    | ≥10.8                          | >1.08<br>≤6.84   | A2    | <10.8                          | ≤6.84            | A3    |
|                        |                                                |                                |                  |       |                                | ≤1.08            | A6    |                                |                  |       |
| 15MHz                  | 1987.5 < F <sub>c</sub> ≤ 1997.5               | ≥8.64                          |                  | A5    | <3.78                          |                  | A5    | ≥3.78<br><8.64                 | >1.44            | A6    |
| 20MHz                  | 1970 < F <sub>c</sub> ≤ 1990                   | ≥12.96                         |                  | A5    | <4.68                          |                  | A5    | ≥4.68<br><12.96                | >2.16            | A6    |
| 20MHz                  | 1990 < F <sub>c</sub> ≤ 1995                   | ≥11.52                         |                  | A5    | <5.58                          |                  | A5    | ≥5.58<br><11.52                | >1.44            | A6    |

NOTE 1: The A-MPR values are listed in Table 6.2.3.15-2.  
NOTE 2: For any undefined region, MPR applies

Table 6.2.3.15-2: A-MPR for modulation and waveform type

| Modulation/Waveform  | A1          | A2          | A3          | A4    | A5          | A6          | A7    |
|----------------------|-------------|-------------|-------------|-------|-------------|-------------|-------|
|                      | Outer/Inner | Outer/Inner | Outer/Inner | Outer | Outer/Inner | Outer/Inner | Outer |
| DFT-s-OFDM PI/2 BPSK | ≤ 11        | ≤ 5         | ≤ 4         | ≤ 8.5 | ≤ 18        | ≤ 10        | ≤ 3.5 |
| DFT-s-OFDM QPSK      | ≤ 11        | ≤ 5         | ≤ 4         | ≤ 8.5 | ≤ 18        | ≤ 10        | ≤ 3.5 |
| DFT-s-OFDM 16 QAM    | ≤ 11        | ≤ 5         | ≤ 4         | ≤ 8.5 | ≤ 18        | ≤ 10        | ≤ 3.5 |
| DFT-s-OFDM 64 QAM    | ≤ 11        | ≤ 5         | ≤ 4         | ≤ 8.5 | ≤ 19        | ≤ 10        | ≤ 3.5 |
| DFT-s-OFDM 256 QAM   | ≤ 11        | ≤ 5         |             | ≤ 8.5 | ≤ 20        | ≤ 10        |       |
| CP-OFDM QPSK         | ≤ 13        | ≤ 6.5       | ≤ 4         | ≤ 8.5 | ≤ 19        | ≤ 12        | ≤ 5.5 |
| CP-OFDM 16 QAM       | ≤ 13        | ≤ 6.5       | ≤ 4         | ≤ 8.5 | ≤ 19        | ≤ 12        | ≤ 5.5 |
| CP-OFDM 64 QAM       | ≤ 13        | ≤ 6.5       | ≤ 4         | ≤ 8.5 | ≤ 19        | ≤ 12        | ≤ 5.5 |
| CP-OFDM 256 QAM      | ≤ 13        | ≤ 6.5       |             | ≤ 8.5 | ≤ 20        | ≤ 12        |       |

NOTE 1: The backoff applied is max(MPR, A-MPR) where MPR is defined in Table 6.2.2-1  
NOTE 2: Outer and inner allocations are defined in clause 6.2.2

6.2.3.16 A-MPR for NS<sub>27</sub>Table 6.2.3.16-1: A-MPR for NS<sub>27</sub>

| Channel Bandwidth, MHz | Carrier Centre Frequency, F <sub>c</sub> , MHz | Region A                     |                            |              |       | Region B     |       |
|------------------------|------------------------------------------------|------------------------------|----------------------------|--------------|-------|--------------|-------|
|                        |                                                | RB <sub>start</sub> *12* SCS | RB <sub>end</sub> *12*S CS | LCRB*12* SCS | A-MPR | LCRB*12* SCS | A-MPR |

|              |                            |                                   |                                   |                 |    |                  |     |  |
|--------------|----------------------------|-----------------------------------|-----------------------------------|-----------------|----|------------------|-----|--|
| 15 MHz       | $3557.5 \leq F_C < 3562.5$ | <1.8 MHz                          |                                   |                 | A3 | $\geq 10.8$ MHz  | A3  |  |
|              | $3687.5 < F_C \leq 3692.5$ | >11.52 MHz                        |                                   |                 |    |                  |     |  |
| 15 MHz       | $3562.5 \leq F_C < 3567.5$ | $\leq 1.08$ MHz                   |                                   | <1.44 MHz       | A4 | $\geq 11.52$ MHz | 2   |  |
|              | $3682.5 < F_C \leq 3687.5$ |                                   | $\geq 13.22$ MHz                  |                 |    |                  |     |  |
| 20 MHz       | $3560 \leq F_C < 3570$     | <3.6 MHz                          |                                   |                 | A5 | $\geq 10.8$ MHz  | A5  |  |
|              | $3680 < F_C \leq 3690$     | >12.96 MHz                        |                                   |                 |    |                  |     |  |
| 20 MHz       | $3570 \leq F_C < 3580$     | $\leq 2.16$ MHz                   |                                   | <1.44 MHz       | A6 | $\geq 14.4$ MHz  | 2   |  |
|              | $3670 < F_C \leq 3680$     |                                   | $\geq 16.92$                      |                 |    |                  |     |  |
| 30 MHz       | $3565 \leq F_C < 3585$     | < 7.38MHz                         |                                   |                 | A7 |                  |     |  |
|              |                            | $\geq 7.38$ MHz                   |                                   | $\geq 15.3$ MHz | A2 |                  |     |  |
|              |                            | $\leq 24.48$ MHz                  |                                   | < 15.3 MHz      | A1 |                  |     |  |
|              |                            | $\geq 24.48$ MHz                  |                                   | < 2.7 MHz       | A7 |                  |     |  |
|              | $3665 < F_C \leq 3685$     |                                   | > 19.44 MHz                       |                 | A7 |                  |     |  |
|              |                            |                                   | $\leq 19.44$ MHz                  | $\geq 15.3$ MHz | A2 |                  |     |  |
|              |                            |                                   | $\geq 3.24$ MHz                   | < 15.3 MHz      | A1 |                  |     |  |
|              |                            |                                   | <3.24 MHz                         | < 2.7MHz        | A7 |                  |     |  |
|              | $3585 \leq F_C \leq 3665$  | $\leq [3.96]$ MHz                 |                                   | < 1.44MHz       | A8 | $\geq 19.44$ MHz | 4   |  |
|              |                            |                                   | $\geq 24.48$ MHz                  |                 | A8 |                  |     |  |
| 40 MHz       | $3570 \leq F_C < 3600$     | <11.34 MHz                        |                                   |                 | A7 |                  |     |  |
|              |                            | $\geq 11.34$ MHz, $\leq 31.0$ MHz |                                   | $\geq 18$ MHz   | A2 |                  |     |  |
|              |                            |                                   |                                   | <18 MHz         | A1 |                  |     |  |
|              |                            | >31.0 MHz                         |                                   | <3.6 MHz        | A7 |                  |     |  |
|              | $3650 < F_C \leq 3680$     |                                   | >24.48 MHz                        |                 | A7 |                  |     |  |
|              |                            |                                   | $\leq 24.48$ MHz, $\geq 6.48$ MHz | $\geq 18$ MHz   | A2 |                  |     |  |
|              |                            |                                   |                                   | <18 MHz         | A1 |                  |     |  |
|              |                            |                                   | <6.48 MHz                         | <3.6 MHz        | A7 |                  |     |  |
| 40 MHz       | $3600 \leq F_C \leq 3650$  | $\leq 6.12$ MHz                   |                                   | <1.44 MHz       | A8 | >20 MHz          | 4.5 |  |
|              |                            |                                   | $\geq 32.76$                      |                 |    |                  |     |  |
| NOTE 1: Void |                            |                                   |                                   |                 |    |                  |     |  |
| NOTE 2: Void |                            |                                   |                                   |                 |    |                  |     |  |

Table 6.2.3.16-2: A-MPR for modulation and waveform type

| Modulation/Waveform |           | A1    | A2    | A3          | A4          | A5          | A6          | A7          | A8          |
|---------------------|-----------|-------|-------|-------------|-------------|-------------|-------------|-------------|-------------|
|                     |           | Outer | Outer | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner |
| DFT-s-OFDM          | PI/2 BPSK | 4.5   | 6     | 4           | 4           | 4           | 4           | 10.5        | 4           |
|                     | QPSK      | 4.5   | 6     | 4           | 4           | 4           | 4           | 10.5        | 4           |
|                     | 16 QAM    | 4.5   | 6     | 5           | 4           | 5           | 4           | 11          | 4           |
|                     | 64 QAM    | 4.5   | 6     | 5           | 4           | 5           | 4           | 11          | 4           |
|                     | 256 QAM   |       | 6     |             |             |             |             | 11          |             |
| CP-OFDM             | QPSK      | 5.5   | 7     | 6           | 4           | 6           | 4           | 11.5        | 4           |
|                     | 16 QAM    | 5.5   | 7     | 6           | 4           | 6           | 4           | 11.5        | 4           |
|                     | 64 QAM    | 5.5   | 7     | 6           | 4           | 6           | 4           | 11.5        | 4           |

|                                                                                       |            |  |   |  |  |  |  |      |  |
|---------------------------------------------------------------------------------------|------------|--|---|--|--|--|--|------|--|
|                                                                                       | 256<br>QAM |  | 7 |  |  |  |  | 11.5 |  |
| NOTE 1: The backoff applied is max (MPR, A-MPR) where MPR is defined in Table 6.2.2-1 |            |  |   |  |  |  |  |      |  |
| NOTE 2: Outer and inner allocations are defined in clause 6.2.2                       |            |  |   |  |  |  |  |      |  |

## 6.2.3.17 A-MPR for NS\_46

Table 6.2.3.17-1: A-MPR regions for NS\_46

| Channel Bandwidth, MHz                                      | Carrier Center Frequency, F <sub>C</sub> , MHz | Regions                       |                                           | A-MPR |
|-------------------------------------------------------------|------------------------------------------------|-------------------------------|-------------------------------------------|-------|
|                                                             |                                                | RB <sub>end</sub> *12*SCS MHz | L <sub>CRB</sub> *12*SCS MHz              |       |
| 25 MHz                                                      | 2534.5 ≤ F <sub>C</sub> ≤ 2557.5               |                               | Note 1                                    | A3    |
| 30 MHz                                                      | 2515 ≤ F <sub>C</sub> ≤ 2555                   | ≥0, <1.44                     | >0                                        | A4    |
|                                                             |                                                | ≥1.44, <13.5                  | >max (0, 12*SCS*RB <sub>end</sub> -1.8)   | A5    |
|                                                             |                                                | ≥13.5, <19.8                  | >11.52                                    | A6    |
|                                                             |                                                | ≥19.8, <25.92                 | >6.3                                      | A7    |
|                                                             |                                                | ≥25.92                        | >0                                        | A8    |
| 35 MHz                                                      | 2517.5 ≤ F <sub>C</sub> ≤ 2552.5               | ≥0, <3.42                     | >0                                        | A4    |
|                                                             |                                                | ≥3.42, <15.84                 | >max (0, 12*SCS*RB <sub>end</sub> - 3.06) | A5    |
|                                                             |                                                | ≥15.84, <22.68                | >12.6                                     | A6    |
|                                                             |                                                | ≥22.68, <28.8                 | >9.0                                      | A7    |
|                                                             |                                                | ≥28.8                         | >0                                        | A8    |
| 40 MHz                                                      | 2520 ≤ F <sub>C</sub> ≤ 2550                   | ≥0, <4.14                     | >0                                        | A4    |
|                                                             |                                                | ≥4.14, <18                    | >max (0, 12*SCS*RB <sub>end</sub> - 4.5)  | A5    |
|                                                             |                                                | ≥18, <25.74                   | >13.5                                     | A6    |
|                                                             |                                                | ≥25.74, <32.4                 | >12.6                                     | A7    |
|                                                             |                                                | ≥32.4                         | >0                                        | A8    |
| 50 MHz                                                      | 2525 ≤ F <sub>C</sub> ≤ 2545                   | ≥0, <9                        | >0                                        | A4    |
|                                                             |                                                | ≥9, <21.6                     | >max (0, 12*SCS*RB <sub>end</sub> - 7.2)  | A5    |
|                                                             |                                                | ≥21.6, <31.5                  | >18                                       | A6    |
|                                                             |                                                | ≥31.5, <39.6                  | >16.2                                     | A7    |
|                                                             |                                                | ≥39.6                         | >0                                        | A8    |
| NOTE 1: > 9.72 MHz for DFT-s-OFDM, > 16.02 MHz for CP-OFDM. |                                                |                               |                                           |       |

Table 6.2.3.17-2: A-MPR for NS\_46

| Modulation/Waveform |           | A3    | A4          | A5          | A6          | A7          | A8          |
|---------------------|-----------|-------|-------------|-------------|-------------|-------------|-------------|
|                     |           | Outer | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner |
| DFT-s-OFDM          | PI/2 BPSK | 4.5   | 5           | 2           | 3.5         | 6           | 10          |
|                     | QPSK      | 4.5   | 5           | 2           | 3.5         | 6           | 10          |
|                     | 16 QAM    | 4.5   | 5           | 2           | 3.5         | 6           | 10          |
|                     | 64 QAM    | 4.5   | 5           |             | 3.5         | 6           | 10          |
|                     | 256 QAM   |       |             |             |             | 6           | 10          |
| CP-OFDM             | QPSK      | 6     | 5           | 3.5         | 5.5         | 7           | 11          |
|                     | 16 QAM    | 6     | 5           | 3.5         | 5.5         | 7           | 11          |
|                     | 64 QAM    | 6     | 5           | 3.5         | 5.5         | 7           | 11          |
|                     | 256 QAM   | 6     |             |             |             | 7           | 11          |

## 6.2.3.18 A-MPR for NS\_47

Table 6.2.3.18-1: A-MPR regions and types for NS\_47 (Power Class 2 and 3)

| Channel Bandwidth, (MHz) | Carrier Centre Frequency, F <sub>c</sub> , (MHz) | RBstart*12*SCS (MHz) | LCRB*12*SCS (MHz) | A-MPR |
|--------------------------|--------------------------------------------------|----------------------|-------------------|-------|
|--------------------------|--------------------------------------------------|----------------------|-------------------|-------|

|                                                        |                  |             |            |    |
|--------------------------------------------------------|------------------|-------------|------------|----|
| 30MHz                                                  | Fc=2560-2560.020 | ≤5.04       | ≤1.44      | A1 |
|                                                        |                  | >5.04, ≤9.6 | ≤1.44      | A2 |
|                                                        |                  | >24.48      | ≤1.44      | A3 |
|                                                        |                  | ≤9.6        | >21        | A2 |
|                                                        |                  | ≤6.12       | >14.4, <21 | A4 |
|                                                        |                  |             | >10, ≤14.4 | A4 |
| NOTE: The A-MPR values are listed in Table 6.2.3.18-2. |                  | >1.44, <10  | A2         |    |

Table 6.2.3.18-2: A-MPR for modulation and waveform type (Power Class 2 and 3)

| Modulation/Waveform  | A1(dB)      |             | A2(dB)      |             | A3(dB)      |             | A4(dB)      |             |
|----------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
|                      | PC3         | PC2         | PC3         | PC2         | PC3         | PC2         | PC3         | PC2         |
|                      | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner |
| DFT-s-OFDM PI/2 BPSK | $\leq 7$    | $\leq 10$   | $\leq 5.5$  | $\leq 8.5$  | $\leq 2$    | $\leq 5$    | $\leq 3$    | $\leq 6$    |
| DFT-s-OFDM QPSK      | $\leq 7$    | $\leq 10$   | $\leq 5.5$  | $\leq 8.5$  | $\leq 2$    | $\leq 5$    | $\leq 3$    | $\leq 6$    |
| DFT-s-OFDM 16 QAM    | $\leq 7$    | $\leq 10$   | $\leq 5.5$  | $\leq 8.5$  |             | $\leq 5$    | $\leq 3$    | $\leq 6$    |
| DFT-s-OFDM 64 QAM    | $\leq 7$    | $\leq 10$   | $\leq 6$    | $\leq 8.5$  |             | $\leq 5$    | $\leq 3$    | $\leq 6$    |
| DFT-s-OFDM 256 QAM   | $\leq 7$    | $\leq 10$   | $\leq 6$    | $\leq 8.5$  |             | $\leq 5$    |             | $\leq 6$    |
| CP-OFDM QPSK         | $\leq 7$    | $\leq 10$   | $\leq 7$    | $\leq 10$   |             | $\leq 5$    | $\leq 4$    | $\leq 7$    |
| CP-OFDM 16 QAM       | $\leq 7$    | $\leq 10$   | $\leq 7$    | $\leq 10$   |             | $\leq 5$    | $\leq 4$    | $\leq 7$    |
| CP-OFDM 64 QAM       | $\leq 7$    | $\leq 10$   | $\leq 7$    | $\leq 10$   |             | $\leq 5$    |             | $\leq 7$    |
| CP-OFDM 256 QAM      | $\leq 7$    | $\leq 10$   | $\leq 7$    | $\leq 10$   |             |             |             | $\leq 7$    |

Table 6.2.3.18-3: A-MPR regions and types for NS\_47 (Power Class 1.5)

| Channel Bandwidth, (MHz)                               | Carrier Centre Frequency, Fc, (MHz) | RBstart*12*SCS (MHz) | LCRB*12*SCS (MHz) | A-MPR |
|--------------------------------------------------------|-------------------------------------|----------------------|-------------------|-------|
| 30MHz                                                  | Fc=2560-2560.020                    | ≤5.04                | ≤1.44             | A1    |
|                                                        |                                     | >5.04, ≤9.6          | ≤1.44             | A2    |
|                                                        |                                     | >24.48               | ≤1.44             | A3    |
|                                                        |                                     | ≤9.6                 | >21               | A2    |
|                                                        |                                     |                      | >14.4, <21        | A4    |
|                                                        |                                     | >6.12, ≤7.92         | >10, ≤14.4        | A5    |
|                                                        |                                     | ≤6.12                | >10, ≤14.4        | A4    |
|                                                        |                                     | >1.44, <10           | A2                |       |
| NOTE: The A-MPR values are listed in Table 6.2.3.18-4. |                                     |                      |                   |       |

Table 6.2.3.18-4: A-MPR for NS\_47 (Power Class 1.5)

| Modulation/Waveform        |           | A1(dB)      | A2(dB)      | A3(dB)      | A4(dB)      | A5(dB)      |
|----------------------------|-----------|-------------|-------------|-------------|-------------|-------------|
|                            |           | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner |
| DFT-s-OFDM                 | PI/2 BPSK | $\leq 13$   | $\leq 11$   | $\leq 8$    | $\leq 8.5$  | $\leq 3$    |
|                            | QPSK      | $\leq 13$   | $\leq 11$   | $\leq 8$    | $\leq 8.5$  | $\leq 3$    |
|                            | 16 QAM    | $\leq 13$   | $\leq 11$   | $\leq 8$    | $\leq 8.5$  | $\leq 3$    |
|                            | 64 QAM    | $\leq 13$   | $\leq 11$   | $\leq 8$    | $\leq 8.5$  |             |
|                            | 256 QAM   | $\leq 13$   | $\leq 11$   | $\leq 8$    | $\leq 8.5$  |             |
| CP-OFDM                    | QPSK      | $\leq 13$   | $\leq 12.5$ | $\leq 8$    | $\leq 9.5$  | $\leq 4$    |
|                            | 16 QAM    | $\leq 13$   | $\leq 12.5$ | $\leq 8$    | $\leq 9.5$  | $\leq 4$    |
|                            | 64 QAM    | $\leq 13$   | $\leq 12.5$ | $\leq 8$    | $\leq 9.5$  |             |
|                            | 256 QAM   | $\leq 13$   | $\leq 12.5$ | $\leq 8$    | $\leq 9.5$  |             |
| NOTE 1: PC1.5 assumes 2Tx. |           |             |             |             |             |             |

## 6.2.3.19 A-MPR for NS\_50

Table 6.2.3.19-1: A-MPR regions for NS\_50 (Power Class 3)

| Channel Bandwidth (MHz) | $RB_{start} * 12 * SCS$ (MHz) | $L_{CRB} * 12 * SCS$ (MHz)                 | A-MPR |
|-------------------------|-------------------------------|--------------------------------------------|-------|
| 25 MHz                  | $\leq L_{CRB} * 12 * SCS - 5$ | $> 5$                                      | A7    |
|                         | $\leq 6.48$                   | $\leq 1.44$                                | A8    |
|                         |                               | $\leq 3.6$                                 | A9    |
| 30 MHz                  | $\leq L_{CRB} * 12 * SCS - 5$ | $> 5$                                      | A7    |
|                         | $\leq 8.64$                   | $\leq 1.44$                                | A8    |
|                         |                               | $\leq 3.6$                                 | A9    |
| 40 MHz                  | $\leq 4.32$                   | $> 0$                                      | A1    |
|                         | $> 4.32, \leq 10.44$          | $\leq 10.8$                                | A3    |
|                         | $> 4.32, \leq 18$             | $> 10.8$                                   | A2    |
|                         | $> 18, \leq 31.68$            | $> \max(31.68 - RB_{start} * 12 * SCS, 0)$ | A6    |
|                         | $> 31.68$                     | $> 0$                                      | A5    |

NOTE 1: The A-MPR values are specified in Table 6.2.3.19-2.

Table 6.2.3.19-2: A-MPR for NS\_50 (Power Class 3)

| Modulation/Waveform |           | A1 (dB)     | A2 (dB)     | A3 (dB)     | A5 (dB)     | A6 (dB)     | A7 (dB)     | A8 (dB)     | A9 (dB)    |
|---------------------|-----------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|------------|
|                     |           | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner | Inner      |
| DFT-s-OFDM          | Pi/2 BPSK | $\leq 11$   | $\leq 7$    | $\leq 3$    | $\leq 5$    | $\leq 2$    | $\leq 4$    | $\leq 2$    |            |
|                     | QPSK      | $\leq 11$   | $\leq 7$    | $\leq 3$    | $\leq 5$    | $\leq 2$    | $\leq 5$    | $\leq 2$    |            |
|                     | 16 QAM    | $\leq 11$   | $\leq 7$    | $\leq 3$    | $\leq 5$    | $\leq 2$    | $\leq 5$    | $\leq 2.5$  |            |
|                     | 64 QAM    | $\leq 11$   | $\leq 7$    | $\leq 3$    | $\leq 5$    |             | $\leq 5$    |             |            |
|                     | 256 QAM   | $\leq 11$   | $\leq 7$    |             | $\leq 5$    |             | $\leq 5$    |             |            |
| CP-OFDM             | QPSK      | $\leq 12$   | $\leq 8$    | $\leq 4.5$  | $\leq 5$    | $\leq 3.5$  | $\leq 6.5$  |             |            |
|                     | 16 QAM    | $\leq 12$   | $\leq 8$    | $\leq 4.5$  | $\leq 5$    | $\leq 3.5$  | $\leq 6.5$  |             | $\leq 3.0$ |
|                     | 64 QAM    | $\leq 12$   | $\leq 8$    | $\leq 4.5$  | $\leq 5$    |             | $\leq 6.5$  |             | $\leq 3.0$ |
|                     | 256 QAM   | $\leq 12$   | $\leq 8$    |             |             |             | $\leq 6.5$  |             |            |

Table 6.2.3.19-3: A-MPR regions for NS\_50 (Power Class 2)

| Channel Bandwidth (MHz) | $RB_{start} * 12 * SCS$ (MHz)        | $L_{CRB} * 12 * SCS$ (MHz)                                                  | A-MPR |
|-------------------------|--------------------------------------|-----------------------------------------------------------------------------|-------|
| 10 MHz                  | $\leq 1.44$                          | $< 1.44$                                                                    | A5    |
|                         | $\leq 1.8$                           | $\geq 2.7 + 2 * RB_{start} * 12 * SCS$                                      | A4    |
|                         | $> 1.8$                              | $\geq 8.1 - RB_{start} * 12 * SCS$                                          | A4    |
| 15 MHz                  | $\leq 2.88$                          | $< 2.7$                                                                     | A5    |
|                         | $\leq 3.24$                          | $\geq 2.7 + 2 * RB_{start} * 12 * SCS$                                      | A3    |
|                         | $> 3.24$                             | $\geq 12.42 - RB_{start} * 12 * SCS$                                        | A4    |
| 20 MHz                  | $\leq 4.32$                          | $< 3.6$                                                                     | A5    |
|                         | $\leq 4.5$                           | $\geq 3.6 + 2 * RB_{start} * 12 * SCS$                                      | A3    |
|                         | $> 4.5$                              | $\geq 17.1 - RB_{start} * 12 * SCS$                                         | A4    |
| 25 MHz                  | $\leq L_{CRB} * 12 * SCS - 5$        | $> 5$                                                                       | A2    |
|                         | $\leq 6.48$                          | $\leq 1.44$                                                                 | A5    |
|                         | $> 8.28$                             | $> \max(21.6 - RB_{start} * 12 * SCS, 0),$<br>$< RB_{start} * 12 * SCS + 5$ | A4    |
|                         | $> 1.8, \leq 6.48$                   | $> 1.44, \leq 3.6$                                                          | A6    |
|                         | $> L_{CRB} * 12 * SCS - 5, \leq 1.8$ | $> 1.44$                                                                    | A4    |

|                                                             |                               |                                                                         |    |
|-------------------------------------------------------------|-------------------------------|-------------------------------------------------------------------------|----|
| 30 MHz                                                      | $\leq L_{CRB} * 12 * SCS - 5$ | $> 5$                                                                   | A2 |
|                                                             | $\leq 7.56$                   | $\leq 1.44$                                                             | A5 |
|                                                             | $> 1.8, \leq 7.56$            | $> 1.44, \leq 3.6$                                                      | A6 |
|                                                             | $\leq 1.8$                    | $> 1.44, < RB_{start} * 12 * SCS + 5$                                   | A4 |
|                                                             | $> 10.8$                      | $> \max(26.64 - RB_{start} * 12 * SCS, 0), < RB_{start} * 12 * SCS + 5$ | A4 |
| 40 MHz                                                      | $\leq 4.32$                   | $> 0$                                                                   | A1 |
|                                                             | $> 4.32$                      | $> RB_{start} * 12 * SCS + 11.88$                                       | A8 |
|                                                             | $> 4.32, \leq 12.96$          | $\leq 10.8$                                                             | A3 |
|                                                             | $> 4.32, \leq 18$             | $> 10.8, \leq RB_{start} * 12 * SCS + 11.88$                            | A7 |
|                                                             | $> 18, \leq 31.68$            | $> \max(31.68 - RB_{start} * 12 * SCS, 0)$                              | A4 |
|                                                             | $> 31.68$                     | $> 0$                                                                   | A9 |
| NOTE 1: The A-MPR values are specified in Table 6.2.3.19-4. |                               |                                                                         |    |

Table 6.2.3.19-4: A-MPR for NS\_50 (Power Class 2)

| Modulation/Waveform |           | A1 (dB)     | A2 (dB)     | A3 (dB)     | A4 (dB)     | A5 (dB)     | A6 (dB)     | A7 (dB)     | A8 (dB)     | A9 (dB)     |
|---------------------|-----------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
|                     |           | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner |
| DFT-s-OFDM          | Pi/2 BPSK | $\leq 11.5$ | $\leq 4.5$  | $\leq 4$    | $\leq 2.5$  | $\leq 4$    | $\leq 1$    | $\leq 3.5$  | $\leq 10$   | $\leq 8$    |
|                     | QPSK      | $\leq 11.5$ | $\leq 5.5$  | $\leq 4$    | $\leq 2.5$  | $\leq 4$    | $\leq 1$    | $\leq 3.5$  | $\leq 10$   | $\leq 8$    |
|                     | 16 QAM    | $\leq 11.5$ | $\leq 5.5$  | $\leq 4$    | $\leq 2.5$  | $\leq 4$    | $\leq 1.5$  | $\leq 3.5$  | $\leq 10$   | $\leq 8$    |
|                     | 64 QAM    | $\leq 11.5$ | $\leq 5.5$  | $\leq 4$    |             | $\leq 4$    |             |             | $\leq 10$   | $\leq 8$    |
|                     | 256 QAM   | $\leq 11.5$ | $\leq 5.5$  |             |             |             |             |             | $\leq 10$   | $\leq 8$    |
| CP-OFDM             | QPSK      | $\leq 12.5$ | $\leq 7$    | $\leq 5.5$  | $\leq 4$    | $\leq 4$    | $\leq 2$    | $\leq 5$    | $\leq 11$   | $\leq 8$    |
|                     | 16 QAM    | $\leq 12.5$ | $\leq 7$    | $\leq 5.5$  | $\leq 4$    | $\leq 4$    |             | $\leq 5$    | $\leq 11$   | $\leq 8$    |
|                     | 64 QAM    | $\leq 12.5$ | $\leq 7$    | $\leq 5.5$  | $\leq 4$    | $\leq 4$    |             | $\leq 5$    | $\leq 11$   | $\leq 8$    |
|                     | 256 QAM   | $\leq 12.5$ | $\leq 7$    |             |             |             |             |             | $\leq 11$   | $\leq 8$    |

## 6.2.3.20 A-MPR for NS\_44

Table 6.2.3.20-1: A-MPR regions for NS\_44

| Channel Bandwidth, MHz | Carrier Center Frequency, $F_c$ , MHz | Regions                   |                                        | A-MPR |
|------------------------|---------------------------------------|---------------------------|----------------------------------------|-------|
|                        |                                       | $RB_{end} * 12 * SCS$ MHz | $L_{CRB} * 12 * SCS$ MHz               |       |
| 25 MHz                 | $2582.5 \leq F_c \leq 2602.5$         | $< 18.0$                  | $> \max(0, 12 * SCS * RB_{end} - 3.6)$ | A3    |
|                        |                                       | $\geq 18.0$               | $< 7.2$                                | A3    |
|                        |                                       | $\geq 18.0$               | $\geq 7.2$                             | A6    |
| 30 MHz                 | $2585 \leq F_c \leq 2600$             | $< 21.6$                  | $> \max(0, 12 * SCS * RB_{end} - 3.6)$ | A3    |
|                        |                                       | $\geq 21.6$               | $< 12.6$                               | A3    |
|                        |                                       | $\geq 21.6$               | $\geq 12.6$                            | A6    |
| 40 MHz                 | $2590 \leq F_c \leq 2595$             | $\geq 0, < 2.88$          | $> 0$                                  | A1    |
|                        |                                       | $\geq 2.88, < 14.4$       | $> \max(0, 12 * SCS * RB_{end} - 3.6)$ | A2    |
|                        |                                       | $\geq 14.4, < 23.4$       | $> 10.8$                               | A3    |
|                        |                                       | $\geq 23.4, < 32.4$       | $> 16.2$                               | A4    |
|                        |                                       | $\geq 32.4$               | $> 0$                                  | A5    |



Table 6.2.3.20-2: A-MPR for NS\_44

| Modulation/Waveform |           | A1          | A2          | A3          | A4          | A5          | A6          |
|---------------------|-----------|-------------|-------------|-------------|-------------|-------------|-------------|
|                     |           | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner |
| DFT-s-OFDM          | PI/2 BPSK | 5           | 2           | 3           | 7           | 12          | 4           |
|                     | QPSK      | 5           | 2           | 3           | 7           | 12          | 4           |
|                     | 16 QAM    | 5           | 2           | 3           | 7           | 12          | 4           |
|                     | 64 QAM    | 5           |             | 3           | 7           | 12          | 4           |
|                     | 256 QAM   | 5           |             |             | 7           | 12          |             |
| CP-OFDM             | QPSK      | 5           | 4           | 5           | 8           | 12          | 6           |
|                     | 16 QAM    | 5           | 4           | 5           | 8           | 12          | 6           |
|                     | 64 QAM    | 5           | 4           | 5           | 8           | 12          | 6           |
|                     | 256 QAM   |             |             |             | 8           | 12          |             |

## 6.2.3.21 A-MPR for NS\_12

Table 6.2.3.21-1: A-MPR regions for NS\_12

| Channel BW | $RB_{Start} \cdot 12 \cdot SCS$ (MHz) | $L_{CRB} \cdot 12 \cdot SCS$ (MHz) | A-MPR |
|------------|---------------------------------------|------------------------------------|-------|
| 5MHz       | $\leq 1.8$                            | $> 0$                              | A1    |
| 10MHz      | $\leq 3.6$                            | $> 0$                              | A1    |

Table 6.2.3.21-2: A-MPR for NS\_12

| Modulation/Waveform  | A1          |
|----------------------|-------------|
|                      | Outer/Inner |
| DFT-s-OFDM PI/2 BPSK | $\leq 5$    |
| DFT-s-OFDM QPSK      | $\leq 5$    |
| DFT-s-OFDM 16 QAM    | $\leq 5.5$  |
| DFT-s-OFDM 64 QAM    | $\leq 5.5$  |
| DFT-s-OFDM 256 QAM   | $\leq 9.5$  |
| CP-OFDM QPSK         | $\leq 7$    |
| CP-OFDM 16 QAM       | $\leq 7$    |
| CP-OFDM 64 QAM       | $\leq 7$    |
| CP-OFDM 256 QAM      | $\leq 9.5$  |

## 6.2.3.22 A-MPR for NS\_13

Table 6.2.3.22-1: A-MPR regions for NS\_13

| Channel BW | Carrier Frequency, $F_c$ , MHz | $RB_{Start} \cdot 12 \cdot SCS$ (MHz) | $L_{CRB} \cdot 12 \cdot SCS$ (MHz) | A-MPR |
|------------|--------------------------------|---------------------------------------|------------------------------------|-------|
| 5MHz       | $819.5 \leq F_c < 821.5$       | $\leq 1.44$                           | $< 1.08$                           | A1    |
|            |                                | $\leq 1.44$                           | $\geq 1.08$                        | A2    |
| 5MHz       | $F_c \geq 821.5$               | $\leq 0.54$                           | $< 1.08$                           | A1    |
|            |                                |                                       | $\geq 3.24$                        | A3    |

Table 6.2.3.22-2: A-MPR for NS\_13

| Modulation/Waveform  | A1          | A2          | A3       |
|----------------------|-------------|-------------|----------|
|                      | Outer/Inner | Outer/Inner | Outer    |
| DFT-s-OFDM PI/2 BPSK | $\leq 3.5$  | $\leq 4.5$  | $\leq 3$ |
| DFT-s-OFDM QPSK      | $\leq 3.5$  | $\leq 4.5$  | $\leq 3$ |
| DFT-s-OFDM 16 QAM    | $\leq 3.5$  | $\leq 5$    | $\leq 3$ |
| DFT-s-OFDM 64 QAM    | $\leq 4.5$  | $\leq 5$    | $\leq 3$ |

|                    |          |            |            |
|--------------------|----------|------------|------------|
| DFT-s-OFDM 256 QAM | $\leq 8$ | $\leq 6$   |            |
| CP-OFDM QPSK       | $\leq 5$ | $\leq 6.5$ | $\leq 4.5$ |
| CP-OFDM 16 QAM     | $\leq 5$ | $\leq 6.5$ | $\leq 4.5$ |
| CP-OFDM 64 QAM     | $\leq 6$ | $\leq 6.5$ | $\leq 4.5$ |
| CP-OFDM 256 QAM    | $\leq 8$ | $\leq 8$   |            |

## 6.2.3.23 A-MPR for NS\_14

Table 6.2.3.23-1: A-MPR regions for NS\_14

| Channel BW | RB <sub>start</sub> *12*SCS (MHz) | L <sub>CRB</sub> *12*SCS (MHz) | A-MPR |
|------------|-----------------------------------|--------------------------------|-------|
| 10MHz      | $\leq 0.18$                       | $< 1.08$                       | A1    |
|            | $\geq 0$                          | $\geq 9$                       | A2    |
| 15MHz      | $\leq 1.8$                        | $< 1.8$                        | A1    |
|            | $\geq 0$                          | $\geq 9$                       | A2    |
| 20MHz      | $\leq 3.42$                       | $< 1.8$                        | A3    |
|            | $\geq 0$                          | $\geq 9$                       | A2    |

Table 6.2.3.23-2: A-MPR for NS\_14

| Modulation/Waveform  | A1          | A2       | A3          |
|----------------------|-------------|----------|-------------|
|                      | Outer/Inner | Outer    | Outer/Inner |
| DFT-s-OFDM PI/2 BPSK | $\leq 3$    | $\leq 2$ | $\leq 3$    |
| DFT-s-OFDM QPSK      | $\leq 3$    | $\leq 2$ | $\leq 3$    |
| DFT-s-OFDM 16 QAM    | $\leq 3$    | $\leq 2$ | $\leq 3$    |
| DFT-s-OFDM 64 QAM    | $\leq 3$    |          | $\leq 3$    |
| DFT-s-OFDM 256 QAM   |             |          | $\leq 8$    |
| CP-OFDM QPSK         | $\leq 5$    | $\leq 4$ | $\leq 5$    |
| CP-OFDM 16 QAM       | $\leq 5$    | $\leq 4$ | $\leq 5$    |
| CP-OFDM 64 QAM       | $\leq 6$    |          | $\leq 6$    |
| CP-OFDM 256 QAM      | $\leq 8$    |          | $\leq 8$    |

## 6.2.3.24 A-MPR for NS\_15

Table 6.2.3.24-1: A-MPR regions for NS\_15

| Channel BW | Carrier Frequency, F <sub>c</sub> , MHz | RB <sub>end</sub> *12*SCS (MHz) | L <sub>CRB</sub> *12*SCS (MHz) | A-MPR |
|------------|-----------------------------------------|---------------------------------|--------------------------------|-------|
| 5MHz       | 840.5 < F <sub>c</sub> ≤ 846.5          | $\geq 3.24$                     | $> 0$                          | A1    |
|            |                                         | $< 3.24, \geq 2.52$             | $\geq 1.44$                    | A2    |
|            |                                         | $< 0.9$                         | $\leq 0.36$                    | A3    |
| 10MHz      | 840 < F <sub>c</sub> ≤ 844              | $\geq 5.76$                     | $> 1.08$                       | A1    |
|            |                                         | $\geq 5.76$                     | $\leq 1.08$                    | A4    |
|            |                                         | $< 5.76, \geq 4.14$             | $\geq 2.7$                     | A2    |
|            |                                         | $< 2.52$                        | $\leq 0.36$                    | A3    |
|            | 835 < F <sub>c</sub> ≤ 840              | $\geq 7.2$                      | $> 0$                          | A1    |
|            |                                         | $< 7.2, \geq 5.22$              | $\geq 4.32$                    | A2    |
|            |                                         | $< 1.08$                        | $\leq 0.36$                    | A3    |
| 15MHz      | 837.5 < F <sub>c</sub> ≤ 841.5          | $\geq 9.36$                     | $> 1.08$                       | A1    |
|            |                                         | $\geq 9.36$                     | $\leq 1.08$                    | A4    |
|            |                                         | $< 9.36, \geq 4.68$             | $\geq 3.6$                     | A2    |
|            |                                         | $< 3.96$                        | $\leq 0.36$                    | A3    |
|            | 831.5 < F <sub>c</sub> ≤ 837.5          | $\geq 10.8$                     | $> 1.08$                       | A1    |
|            |                                         | $\geq 10.8$                     | $\leq 1.08$                    | A4    |
|            |                                         | $< 10.8, \geq 6.48$             | $\geq 3.6$                     | A2    |
|            |                                         | $< 2.7$                         | $\leq 0.36$                    | A3    |
|            | F <sub>c</sub> ≤ 831.5                  | $\geq 13.14$                    | $> 0$                          | A1    |
|            |                                         | $< 13.14, \geq 7.92$            | $\geq 3.6$                     | A2    |
| 20MHz      | 835 < F <sub>c</sub> ≤ 839              | $< 0.72$                        | $\leq 0.36$                    | A3    |
|            |                                         | $\geq 12.24$                    | $> 1.08$                       | A1    |
|            |                                         | $\geq 12.24$                    | $\leq 1.08$                    | A4    |

|  |                |                     |             |    |
|--|----------------|---------------------|-------------|----|
|  | $F_c \leq 835$ | $<12.24, \geq 8.46$ | $\geq 5.4$  | A2 |
|  |                | $<5.58$             | $\leq 0.36$ | A3 |
|  |                | $\geq 13.68$        | $>1.08$     | A1 |
|  |                | $\geq 13.68$        | $\leq 1.08$ | A4 |
|  |                | $<13.68, \geq 8.46$ | $\geq 5.4$  | A2 |
|  |                | $<4.32$             | $\leq 0.36$ | A3 |

Table 6.2.3.24-2: A-MPR for NS\_15

| Modulation/Waveform  | A1          | A2          | A3          | A4          |
|----------------------|-------------|-------------|-------------|-------------|
|                      | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner |
| DFT-s-OFDM PI/2 BPSK | $\leq 9$    | $\leq 5$    | $\leq 4$    | $\leq 9$    |
| DFT-s-OFDM QPSK      | $\leq 9$    | $\leq 5$    | $\leq 4$    | $\leq 9$    |
| DFT-s-OFDM 16 QAM    | $\leq 9$    | $\leq 5$    | $\leq 4$    | $\leq 9$    |
| DFT-s-OFDM 64 QAM    | $\leq 9$    | $\leq 5$    | $\leq 4$    | $\leq 9$    |
| DFT-s-OFDM 256 QAM   | $\leq 9$    | $\leq 5$    | $\leq 9$    | $\leq 13.5$ |
| CP-OFDM QPSK         | $\leq 10.5$ | $\leq 6.5$  | $\leq 4$    | $\leq 10.5$ |
| CP-OFDM 16 QAM       | $\leq 10.5$ | $\leq 6.5$  | $\leq 4$    | $\leq 10.5$ |
| CP-OFDM 64 QAM       | $\leq 10.5$ | $\leq 6.5$  | $\leq 4$    | $\leq 10.5$ |
| CP-OFDM 256 QAM      | $\leq 10.5$ | $\leq 6.5$  | $\leq 9$    | $\leq 13.5$ |

## 6.2.3.25 A-MPR for NS\_45

Table 6.2.3.25-1: A-MPR for NS\_45

| Modulation/Waveform |           | Outer      |
|---------------------|-----------|------------|
| DFT-s-OFDM          | Pi/2 BPSK | $\leq 1.5$ |
|                     | QPSK      | $\leq 2$   |
|                     | 16 QAM    | $\leq 2.5$ |
|                     | 64 QAM    | $\leq 3$   |

## 6.2.3.26 A-MPR for NS\_48

Table 6.2.3.26-1: A-MPR regions for NS\_48 (Power Class 3)

| Channel Bandwidth, MHz | Carrier Center Frequency, $F_c$ , MHz | Regions                   |                                           | A-MPR |
|------------------------|---------------------------------------|---------------------------|-------------------------------------------|-------|
|                        |                                       | $RB_{end} * 12 * SCS$ MHz | $L_{CRB} * 12 * SCS$ MHz                  |       |
| 25 MHz                 | $1932.5 \leq F_c \leq 1967.5$         | $\geq 0$                  | $\geq 9.72$                               | A3    |
|                        |                                       | $\geq 18.72$              | $<1.08$                                   | A3    |
| 30 MHz                 | $1935 \leq F_c \leq 1965$             | $\geq 0$                  | $\geq 13.5$                               | A3    |
|                        |                                       | $\geq 21.6$               | $<1.08$                                   | A5    |
| 40 MHz                 | $1940 \leq F_c \leq 1960$             | $\geq 0, <2.88$           | $\geq 0$                                  | A2    |
|                        |                                       | $\geq 2.88, <17.1$        | $\geq \max(0, 12 * SCS * RB_{end} - 3.6)$ | A3    |
|                        |                                       | $\geq 17.1, <27.36$       | $\geq 13.5$                               | A4    |
|                        |                                       | $\geq 27.36, <34.56$      | $\geq 13.5$                               | A2    |
|                        |                                       | $\geq 27.36, <34.56$      | $<1.08$                                   | A3    |
|                        |                                       | $\geq 34.56$              | $\geq 0$                                  | A1    |
| 45 MHz                 | $1942.5 \leq F_c \leq 1957.5$         | $\geq 0, <4.86$           | $>0$                                      | A2    |
|                        |                                       | $\geq 4.86, <19$          | $\geq \max(0, 12 * SCS * RB_{end} - 3.6)$ | A4    |
|                        |                                       | $\geq 19, <37.44$         | $\geq 15.4$                               | A2    |
|                        |                                       | $\geq 30.96, <37.44$      | $<1.08$                                   | A5    |
|                        |                                       | $\geq 37.44$              | $>0$                                      | A1    |
| 50 MHz                 | $1945 \leq F_c \leq 1955$             | $\geq 0, <6.12$           | $>0$                                      | A2    |
|                        |                                       | $\geq 6.12, <20.7$        | $\geq \max(0, 12 * SCS * RB_{end} - 3.6)$ | A4    |
|                        |                                       | $\geq 20.7, <41.04$       | $\geq 17.1$                               | A2    |
|                        |                                       | $\geq 33.84, <41.04$      | $<1.08$                                   | A5    |
|                        |                                       | $\geq 41.04$              | $>0$                                      | A1    |

Table 6.2.3.26-2: A-MPR for NS\_48 (Power Class 3)

| Modulation/Waveform |           | A1          | A2          | A3          | A4          | A5          |
|---------------------|-----------|-------------|-------------|-------------|-------------|-------------|
|                     |           | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner |
| DFT-S-OFDM          | PI/2 BPSK | ≤10         | ≤6          | ≤3          | ≤4          | ≤5          |
|                     | QPSK      | ≤10         | ≤6          | ≤3          | ≤4          | ≤5          |
|                     | 16 QAM    | ≤10         | ≤6          | ≤3          | ≤4          | ≤5          |
|                     | 64 QAM    | ≤10         | ≤6          | ≤3          | ≤4          | ≤5          |
|                     | 256 QAM   | ≤10         | ≤6          | ≤3          | ≤4          | ≤5          |
| CP-OFDM             | QPSK      | ≤11         | ≤7          | ≤4.5        | ≤5.5        | ≤5          |
|                     | 16 QAM    | ≤11         | ≤7          | ≤4.5        | ≤5.5        | ≤5          |
|                     | 64 QAM    | ≤11         | ≤7          | ≤4.5        | ≤5.5        | ≤5          |
|                     | 256 QAM   | ≤11         | ≤7          | ≤4.5        | ≤5.5        | ≤5          |

Table 6.2.3.26-3: A-MPR regions for NS\_48 (Power Class 2)

| Channel Bandwidth, MHz | Carrier Center Frequency, F <sub>c</sub> , MHz | Regions                       |                                                     | A-MPR |
|------------------------|------------------------------------------------|-------------------------------|-----------------------------------------------------|-------|
|                        |                                                | RB <sub>end</sub> *12*SCS MHz | L <sub>CRB</sub> *12*SCS MHz                        |       |
| 10 MHz                 | 1925 ≤ F <sub>c</sub> ≤ 1975                   | ≥0                            | ≥8.1                                                | A6    |
|                        |                                                | <1.8                          | ≥0                                                  | A6    |
| 15 MHz                 | 1927.5 ≤ F <sub>c</sub> ≤ 1972.5               | ≥0                            | ≥9                                                  | A6    |
|                        |                                                | ≥0                            | ≥max (0, 12*SCS* RB <sub>end</sub> - 2.88)<br><9    | A6    |
| 20 MHz                 | 1930 ≤ F <sub>c</sub> ≤ 1970                   | ≥0                            | ≥9.72                                               | A4    |
|                        |                                                | ≥0                            | ≥max (0, 12*SCS* RB <sub>end</sub> - 3.6)<br><9.72  | A6    |
| 25 MHz                 | 1932.5 ≤ F <sub>c</sub> ≤ 1967.5               | ≥0                            | ≥9.72                                               | A4    |
|                        |                                                | ≥18.72                        | <1.08                                               | A3    |
|                        |                                                | ≥0                            | ≥max (0, 12*SCS*RB <sub>end</sub> - 1.08)<br>< 9.72 | A4    |
| 30 MHz                 | 1935 ≤ F <sub>c</sub> ≤ 1965                   | ≥0                            | ≥12.96                                              | A4    |
|                        |                                                | ≥21.6                         | <1.08                                               | A5    |
|                        |                                                | ≥0                            | ≥max (0, 12*SCS*RB <sub>end</sub> - 3.6)<br>< 12.96 | A4    |
| 40 MHz                 | 1940 ≤ F <sub>c</sub> ≤ 1960                   | ≥0, <2.88                     | ≥0                                                  | A1    |
|                        |                                                | ≥2.88, <17.1                  | ≥max (0, 12*SCS*RB <sub>end</sub> - 4.68)           | A3    |
|                        |                                                | ≥17.1, <27.36                 | ≥12.96                                              | A4    |
|                        |                                                | ≥27.36, <34.56                | ≥12.96                                              | A2    |
|                        |                                                | ≥27.36, <34.56                | <1.08                                               | A3    |
|                        |                                                | ≥34.56                        | ≥0                                                  | A1    |
| 45 MHz                 | 1942.5 ≤ F <sub>c</sub> ≤ 1957.5               | ≥0, <5.22                     | >0                                                  | A1    |
|                        |                                                | ≥5.22, <19                    | ≥max (0, 12*SCS*RB <sub>end</sub> - 5.4)            | A4    |
|                        |                                                | ≥19, <37.44                   | ≥14.04                                              | A2    |
|                        |                                                | ≥30.96, <37.44                | <1.08                                               | A5    |
|                        |                                                | ≥37.44                        | >0                                                  | A1    |
| 50 MHz                 | 1945 ≤ F <sub>c</sub> ≤ 1955                   | ≥0, <7.2                      | >0                                                  | A1    |
|                        |                                                | ≥7.2, <20.7                   | ≥max (0, 12*SCS*RB <sub>end</sub> - 5.4)            | A4    |
|                        |                                                | ≥20.7, <41.04                 | ≥15.12                                              | A2    |
|                        |                                                | ≥33.84, <41.04                | <1.08                                               | A5    |
|                        |                                                | ≥41.04                        | >0                                                  | A1    |

Table 6.2.3.26-4: A-MPR for NS\_48 (Power Class 2)

| Modulation/Waveform | A1          | A2          | A3          | A4          | A5          | A6          |
|---------------------|-------------|-------------|-------------|-------------|-------------|-------------|
|                     | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner |

|            |           |              |            |            |            |            |            |
|------------|-----------|--------------|------------|------------|------------|------------|------------|
| DFT-s-OFDM | PI/2 BPSK | $\leq[12]$   | $\leq 8.0$ | $\leq 4.0$ | $\leq 4.5$ | $\leq 6.0$ | $\leq 3.0$ |
|            | QPSK      | $\leq[12]$   | $\leq 8.0$ | $\leq 4.0$ | $\leq 4.5$ | $\leq 6.0$ | $\leq 3.0$ |
|            | 16 QAM    | $\leq[12]$   | $\leq 8.0$ | $\leq 4.0$ | $\leq 4.5$ | $\leq 6.0$ | $\leq 3.0$ |
|            | 64 QAM    | $\leq[12]$   | $\leq 8.0$ | $\leq 4.0$ | $\leq 4.5$ | $\leq 6.0$ | $\leq 3.0$ |
|            | 256 QAM   | $\leq[12]$   | $\leq 8.0$ | $\leq 4.0$ | $\leq 4.5$ | $\leq 6.0$ | $\leq 3.0$ |
| CP-OFDM    | QPSK      | $\leq[12.5]$ | $\leq 9.0$ | $\leq 5.5$ | $\leq 6.0$ | $\leq 6.0$ | $\leq 4.5$ |
|            | 16 QAM    | $\leq[12.5]$ | $\leq 9.0$ | $\leq 5.5$ | $\leq 6.0$ | $\leq 6.0$ | $\leq 4.5$ |
|            | 64 QAM    | $\leq[12.5]$ | $\leq 9.0$ | $\leq 5.5$ | $\leq 6.0$ | $\leq 6.0$ | $\leq 4.5$ |
|            | 256 QAM   | $\leq[12.5]$ | $\leq 9.0$ | $\leq 5.5$ | $\leq 6.0$ | $\leq 6.0$ | $\leq 4.5$ |

## 6.2.3.27 A-MPR for NS\_49

Table 6.2.3.27-1: A-MPR regions for NS\_49 (Power Class 3)

| Channel Bandwidth, MHz | Carrier Center Frequency, $F_c$ , MHz | Regions                   |                                                     | A-MPR |
|------------------------|---------------------------------------|---------------------------|-----------------------------------------------------|-------|
|                        |                                       | $RB_{end} * 12 * SCS$ MHz | $L_{CRB} * 12 * SCS$ MHz                            |       |
| 25 MHz                 | $1932.5 \leq F_c \leq 1967.5$         | $\geq 0$                  | $\geq 9.72$                                         | A3    |
|                        |                                       | $\geq 18.72$              | $< 1.08$                                            | A3    |
|                        |                                       | $\leq 3.96$               | $< 1.08$                                            | A3    |
| 30 MHz                 | $1935 \leq F_c \leq 1965$             | $\geq 0, < 3.6$           | $\geq 0$                                            | A1    |
|                        |                                       | $\geq 3.6, < 6.48$        | $\geq 0$                                            | A5    |
|                        |                                       | $\geq 6.48, < 14.4$       | $\geq \max(0, 12 * SCS * RB_{end} - 3.6)$           | A3    |
|                        |                                       | $\geq 14.4, < 21.6$       | $\geq 10.8$                                         | A4    |
|                        |                                       | $\geq 21.6$               | $\geq 10.8$                                         | A2    |
|                        |                                       | $\geq 21.6$               | $< 1.08$                                            | A5    |
| 40 MHz                 | $1940 \leq F_c \leq 1960$             | $\geq 0, < 7.2$           | $\geq 0$                                            | A1    |
|                        |                                       | $\geq 7.2, < 10.44$       | $< 1.08$                                            | A5    |
|                        |                                       | $\geq 7.2, < 18$          | $\geq \max(0, 12 * SCS * RB_{end} - 3.6)$           | A4    |
|                        |                                       | $\geq 18, < 34.56$        | $\geq 14.4, < 28.8$                                 | A2    |
|                        |                                       | $\geq 27.36, < 34.56$     | $< 1.08$                                            | A5    |
|                        |                                       | $< 34.56$                 | $\geq 28.8$                                         | A1    |
| 45 MHz                 | $1942.5 \leq F_c \leq 1957.5$         | $\geq 34.56$              | $\geq 0$                                            | A1    |
|                        |                                       | $\geq 6.12, < 12.42$      | $< \min[1.08, \max(0, 12 * SCS * RB_{end} - 6.12)]$ | A5    |
|                        |                                       | $\geq 30.76, < 36.72$     | $< 1.08$                                            | A5    |
|                        |                                       | $< 36.72$                 | $\geq 16.2, < \max(0, 12 * SCS * RB_{end} - 6.12)$  | A2    |
|                        |                                       | $< 36.72$                 | $\geq \max(0, 12 * SCS * RB_{end} - 6.12)$          | A1    |
|                        |                                       | $\geq 36.72$              | $> 0$                                               | A1    |
| 50 MHz                 | $1945 \leq F_c \leq 1955$             | $\geq 7.74, < 14.4$       | $< \min[1.08, \max(0, 12 * SCS * RB_{end} - 7.74)]$ | A5    |
|                        |                                       | $\geq 36, < 39.6$         | $< 1.08$                                            | A5    |
|                        |                                       | $< 39.6$                  | $\geq 18, < \max(0, 12 * SCS * RB_{end} - 7.74)$    | A2    |
|                        |                                       | $< 39.6$                  | $\geq \max(0, 12 * SCS * RB_{end} - 7.74)$          | A1    |
|                        |                                       | $\geq 39.6$               | $> 0$                                               | A1    |

Table 6.2.3.27-2: A-MPR for NS\_49 (Power Class 3)

| Modulation/Waveform |           | A1          | A2          | A3          | A4          | A5          |
|---------------------|-----------|-------------|-------------|-------------|-------------|-------------|
|                     |           | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner |
| DFT-s-OFDM          | PI/2 BPSK | $\leq 10$   | $\leq 6$    | $\leq 3$    | $\leq 4$    | $\leq 5$    |
|                     | QPSK      | $\leq 10$   | $\leq 6$    | $\leq 3$    | $\leq 4$    | $\leq 5$    |
|                     | 16 QAM    | $\leq 10$   | $\leq 6$    | $\leq 3$    | $\leq 4$    | $\leq 5$    |
|                     | 64 QAM    | $\leq 10$   | $\leq 6$    | $\leq 3$    | $\leq 4$    | $\leq 5$    |
|                     | 256 QAM   | $\leq 10$   | $\leq 6$    | $\leq 3$    | $\leq 4$    | $\leq 5$    |

|         |         |           |          |            |            |          |
|---------|---------|-----------|----------|------------|------------|----------|
| CP-OFDM | QPSK    | $\leq 11$ | $\leq 7$ | $\leq 4.5$ | $\leq 5.5$ | $\leq 5$ |
|         | 16 QAM  | $\leq 11$ | $\leq 7$ | $\leq 4.5$ | $\leq 5.5$ | $\leq 5$ |
|         | 64 QAM  | $\leq 11$ | $\leq 7$ | $\leq 4.5$ | $\leq 5.5$ | $\leq 5$ |
|         | 256 QAM | $\leq 11$ | $\leq 7$ | $\leq 4.5$ | $\leq 5.5$ | $\leq 5$ |

Table 6.2.3.27-3: A-MPR regions for NS\_49 (Power Class 2)

| Channel Bandwidth, MHz | Carrier Center Frequency, $F_c$ , MHz | Regions                   |                                                       | A-MPR |
|------------------------|---------------------------------------|---------------------------|-------------------------------------------------------|-------|
|                        |                                       | $RB_{end} * 12 * SCS$ MHz | $L_{CRB} * 12 * SCS$ MHz                              |       |
| 10 MHz                 | $1925 \leq F_c \leq 1975$             | $\geq 0$                  | $\geq 8.1$                                            | A3    |
|                        |                                       | $< 1.8$                   | $\geq 0$                                              | A3    |
| 15 MHz                 | $1927.5 \leq F_c \leq 1972.5$         | $\geq 0$                  | $\geq 9$                                              | A3    |
|                        |                                       | $\geq 0$                  | $\geq \max(0, 12 * SCS * RB_{end} - 2.88)$<br>$< 9$   | A3    |
| 20 MHz                 | $1930 \leq F_c \leq 1970$             | $\geq 0$                  | $\geq 9.72$                                           | A4    |
|                        |                                       | $\geq 0$                  | $\geq \max(0, 12 * SCS * RB_{end} - 3.6)$<br>$< 9.72$ | A3    |
| 25 MHz                 | $1932.5 \leq F_c \leq 1967.5$         | $\geq 0$                  | $\geq 7.92$                                           | A4    |
|                        |                                       | $\geq 18.72$              | $< 1.08$                                              | A3    |
|                        |                                       | $\leq 6.48$               | $< 3.6$                                               | A3    |
| 30 MHz                 | $1935 \leq F_c \leq 1965$             | $\geq 0, < 3.6$           | $\geq 0$                                              | A1    |
|                        |                                       | $\geq 3.6, < 7.92$        | $\geq 0$                                              | A5    |
|                        |                                       | $\geq 7.92, < 14.4$       | $\geq \max(0, 12 * SCS * RB_{end} - 4.32)$            | A3    |
|                        |                                       | $\geq 14.4, < 21.6$       | $\geq 10.44$                                          | A4    |
|                        |                                       | $\geq 21.6$               | $\geq 10.44$                                          | A2    |
|                        |                                       | $\geq 21.6$               | $< 1.8$                                               | A1    |
| 40 MHz                 | $1940 \leq F_c \leq 1960$             | $\geq 0, < 9$             | $\geq 0$                                              | A1    |
|                        |                                       | $\geq 9, < 11.52$         | $< 3.06$                                              | A5    |
|                        |                                       | $\geq 9, < 18$            | $\geq \max(3.06, 12 * SCS * RB_{end} - 6.48)$         | A4    |
|                        |                                       | $\geq 18, < 34.56$        | $\geq 11.16, < 27$                                    | A2    |
|                        |                                       | $\geq 27.36, < 34.56$     | $< 1.08$                                              | A5    |
|                        |                                       | $< 34.56$                 | $\geq 27$                                             | A1    |
|                        |                                       | $\geq 34.56$              | $\geq 0$                                              | A1    |
| 45 MHz                 | $1942.5 \leq F_c \leq 1957.5$         | $\geq 7.92, < 12.42$      | $< \min[1.08, \max(0, 12 * SCS * RB_{end} - 7.92)]$   | A5    |
|                        |                                       | $\geq 30.76, < 36.72$     | $< 1.08$                                              | A5    |
|                        |                                       | $< 36.72$                 | $\geq 12.24, < \max(0, 12 * SCS * RB_{end} - 7.92)$   | A2    |
|                        |                                       | $< 36.72$                 | $\geq \max(0, 12 * SCS * RB_{end} - 7.92)$            | A1    |
|                        |                                       | $\geq 36.72$              | $> 0$                                                 | A1    |
| 50 MHz                 | $1945 \leq F_c \leq 1955$             | $\geq 10.08, < 14.4$      | $< \min[1.08, \max(0, 12 * SCS * RB_{end} - 10.08)]$  | A5    |
|                        |                                       | $\geq 36, < 39.6$         | $< 1.08$                                              | A5    |
|                        |                                       | $< 39.6$                  | $\geq 13.68, < \max(0, 12 * SCS * RB_{end} - 10.08)$  | A2    |
|                        |                                       | $< 39.6$                  | $\geq \max(0, 12 * SCS * RB_{end} - 10.08)$           | A1    |
|                        |                                       | $\geq 39.6$               | $> 0$                                                 | A1    |

Table 6.2.3.27-4: A-MPR for NS\_49 (Power Class 2)

| Modulation/Waveform |           | A1            | A2          | A3          | A4          | A5          |
|---------------------|-----------|---------------|-------------|-------------|-------------|-------------|
|                     |           | Outer/Inner   | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner |
| DFT-s-OFDM          | PI/2 BPSK | $\leq [12.5]$ | $\leq 7$    | $\leq 4$    | $\leq 5.5$  | $\leq 6$    |
|                     | QPSK      | $\leq [12.5]$ | $\leq 7$    | $\leq 4$    | $\leq 5.5$  | $\leq 6$    |
|                     | 16 QAM    | $\leq [12.5]$ | $\leq 7$    | $\leq 4$    | $\leq 5.5$  | $\leq 6$    |
|                     | 64 QAM    | $\leq [12.5]$ | $\leq 7$    | $\leq 4$    | $\leq 5.5$  | $\leq 6$    |
|                     | 256 QAM   | $\leq [12.5]$ | $\leq 7$    | $\leq 4$    | $\leq 5.5$  | $\leq 6$    |
| CP-OFDM             | QPSK      | $\leq [13.5]$ | $\leq 8$    | $\leq 5.5$  | $\leq 7.5$  | $\leq 6$    |
|                     | 16 QAM    | $\leq [13.5]$ | $\leq 8$    | $\leq 5.5$  | $\leq 7.5$  | $\leq 6$    |

|  |         |               |          |            |            |          |
|--|---------|---------------|----------|------------|------------|----------|
|  | 64 QAM  | $\leq [13.5]$ | $\leq 8$ | $\leq 5.5$ | $\leq 7.5$ | $\leq 6$ |
|  | 256 QAM | $\leq [13.5]$ | $\leq 8$ | $\leq 5.5$ | $\leq 7.5$ | $\leq 6$ |

## 6.2.3.28 A-MPR for NS\_51

Table 6.2.3.28-1: A-MPR regions for NS\_51

| Channel Bandwidth, MHz | Carrier Center Frequency, $F_c$ , MHz | Regions                   |                                            | A-MPR |
|------------------------|---------------------------------------|---------------------------|--------------------------------------------|-------|
|                        |                                       | $RB_{end} * 12 * SCS$ MHz | $L_{CRB} * 12 * SCS$ MHz                   |       |
| 50 MHz                 | $F_c \leq 1945$                       | $\leq 4.5$                | $> 0$                                      | A7    |
|                        |                                       | $> 4.5, < 32.4$           | $\geq \max(0, 12 * SCS * RB_{end} - 14.4)$ | A4    |
|                        |                                       | $< 32.4$                  | $< \max(0, 12 * SCS * RB_{end} - 14.4)$    | A5    |
|                        |                                       | $\geq 32.4$               | $> 0$                                      | A6    |
| 50 MHz                 | $1945 < F_c \leq 1980$                | $< 27$                    | $\geq \max(0, 12 * SCS * RB_{end} - 14.4)$ | A1    |
|                        |                                       | $< 27$                    | $< \max(0, 12 * SCS * RB_{end} - 14.4)$    | A2    |
|                        |                                       | $\geq 27$                 | $> 0$                                      | A3    |

Table 6.2.3.28-2: A-MPR for NS\_51

| Modulation/Waveform |           | A1          | A2          | A3          | A4          | A5          | A6          | A7          |
|---------------------|-----------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
|                     |           | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner |
| DFT-s-OFDM          | PI/2 BPSK | 17          | 12.5        | 22          | 7           | 4.5         | 16          | 14          |
|                     | QPSK      | 17          | 12.5        | 22          | 7           | 4.5         | 16          | 14          |
|                     | 16 QAM    | 17          | 12.5        | 22          | 7           | 4.5         | 16          | 14          |
|                     | 64 QAM    | 17          | 12.5        | 22          | 7           | 4.5         | 16          | 14          |
|                     | 256 QAM   | 17          | 12.5        | 22          | 7           | 4.5         | 16          | 14          |
| CP-OFDM             | QPSK      | 17          | 12.5        | 22          | 8.5         | 4.5         | 17          | 14          |
|                     | 16 QAM    | 17          | 12.5        | 22          | 8.5         | 4.5         | 17          | 14          |
|                     | 64 QAM    | 17          | 12.5        | 22          | 8.5         | 4.5         | 17          | 14          |
|                     | 256 QAM   | 17          | 12.5        | 22          | 8.5         | 4.5         | 17          | 14          |

## 6.2.3.29 A-MPR for NS\_07

Table 6.2.3.29-1: A-MPR regions for NS\_07

| Channel Bandwidth, MHz | Carrier Frequency, MHz    | Regions                     |                          | A-MPR |
|------------------------|---------------------------|-----------------------------|--------------------------|-------|
|                        |                           | $RB_{start} * 12 * SCS$ MHz | $L_{CRB} * 12 * SCS$ MHz |       |
| 5 MHz                  | $782 \leq F_c \leq 784.5$ | $\geq 0$                    | $\geq 1.8$               | A3    |
| 5 MHz                  | $779.5 \leq F_c < 782$    | $\leq 0.9$                  | $\geq 0$                 | A1    |
|                        |                           | $> 0.9, \leq 1.26$          | $\geq 1.26$              | A2    |
|                        |                           | $> 1.26, \leq 3.42$         | $\geq 1.8$               | A3    |
|                        |                           | $> 3.42$                    | $\leq 0.36$              | A4    |
| 10 MHz                 | $F_c = 782$               | $\leq 2.34$                 | $\geq 0$                 | A1    |
|                        |                           | $> 2.34, \leq 3.24$         | $\geq 1.44$              | A2    |
|                        |                           | $> 3.24, \leq 6.48$         | $\geq 3.24$              | A3    |
|                        |                           | $> 6.48$                    | $\leq 0.36$              | A4    |

Table 6.2.3.29-2: A-MPR for NS\_07

| Modulation/Waveform  | A1          | A2          | A3          | A4          |
|----------------------|-------------|-------------|-------------|-------------|
|                      | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner |
| DFT-s-OFDM PI/2 BPSK | 12          | 9           | 6           | 3           |
| DFT-s-OFDM QPSK      | 12          | 9           | 6           | 3           |
| DFT-s-OFDM 16 QAM    | 12          | 9           | 6           | 3           |

|                    |    |    |   |   |
|--------------------|----|----|---|---|
| DFT-s-OFDM 64 QAM  | 12 | 9  | 6 | 3 |
| DFT-s-OFDM 256 QAM | 12 | 9  | 6 | 3 |
| CP-OFDM QPSK       | 14 | 10 | 7 | 3 |
| CP-OFDM 16 QAM     | 14 | 10 | 7 | 3 |
| CP-OFDM 64 QAM     | 14 | 10 | 7 | 3 |
| CP-OFDM 256 QAM    | 14 | 10 | 7 | 3 |

### 6.2.3.30 A-MPR for NS\_56

For 5 MHz channel centered on frequencies ( $F_c$ ) = 1630.0, 1630.3 MHz, A-MPR is defined as

```

if  $RB_{start} \leq \lceil 3/SCS/15 \text{ kHz} \rceil$  and  $L_{CRB} \leq \lceil 17/SCS/15 \text{ kHz} \rceil$ ,
then
    the A-MPR = 14 dB for SCS = 15 kHz and AMPR = 8 dB for SCS  $\geq$  30 kHz,
else,
if  $RB_{start} \leq \lceil 3/(SCS/15 \text{ kHz}) \rceil$  and  $L_{CRB} > \lceil 17/(SCS/15 \text{ kHz}) \rceil$ ,
then
    the A-MPR = 6 dB,
else,
if  $RB_{start} \leq \lceil 8/(SCS/15 \text{ kHz}) \rceil$ ,
then
    the A-MPR = 4 dB.

```

For 5 MHz channel centered on frequencies ( $F_c$ ) = 1635.0, 1649.0, 1654.0 MHz, no A-MPR is needed.

For Channel 10 MHz with center frequency of 1632.5 MHz, A-MPR is defined as

```

if  $RB_{start} < \lceil 3/(SCS/15 \text{ kHz}) \rceil$  and  $L_{CRB} \leq \lceil 8/(SCS/15 \text{ kHz}) \rceil$ ,
then
    the A-MPR = 12 dB for SCS = 15 kHz and AMPR = 8 dB for SCS  $\geq$  30 kHz,
else,
if  $RB_{start} < \lceil 9/(SCS/15 \text{ kHz}) \rceil$ , and  $L_{CRB} > \lceil 8/(SCS/15 \text{ kHz}) \rceil$ ,
then
    the A-MPR = 8 dB,
else,
if  $RB_{start} \leq \lceil 18/(SCS/15 \text{ kHz}) \rceil$ ,
then
    the A-MPR = 6 dB,
else,
if  $RB_{start} \geq \lfloor 40/(SCS/15 \text{ kHz}) \rfloor$ , and  $L_{CRB} \leq \lceil 7/(SCS/15 \text{ kHz}) \rceil$ ,
then
    the A-MPR = 5 dB,
else,
if  $RB_{start} \geq \lfloor 40/(SCS/15 \text{ kHz}) \rfloor$  and  $L_{CRB} > \lceil 7/(SCS/15 \text{ kHz}) \rceil$ ,
then
    the A-MPR = 3 dB,
else,
if  $RB_{start} \geq \lfloor 35/(SCS/15 \text{ kHz}) \rfloor$  and  $L_{CRB} \leq \lceil 7/(SCS/15 \text{ kHz}) \rceil$ ,
then
    the A-MPR = 4 dB,
else,
if  $RB_{start} \geq \lfloor 35/(SCS/15 \text{ kHz}) \rfloor$  and  $L_{CRB} > \lceil 7/(SCS/15 \text{ kHz}) \rceil$ ,
then
    the A-MPR = 2 dB.

```

For 10 MHz channel centered on frequency of 1651.5 MHz, no A-MPR is needed.

## 6.2.4 Configured transmitted power

The UE is allowed to set its configured maximum output power  $P_{CMAX,f,c}$  for carrier  $f$  of serving cell  $c$  in each slot. The configured maximum output power  $P_{CMAX,f,c}$  is set within the following bounds:

$$P_{CMAX_{L,f,c}} \leq P_{CMAX_{f,c}} \leq P_{CMAX_{H,f,c}} \text{ with}$$

$$P_{CMAX_{L,f,c}} = \min \{ P_{EMAX,c} - \Delta T_{C,c}, (P_{PowerClass} - \Delta P_{PowerClass}) - \max(\max(MPR_c + \Delta MPR_c, A-MPR_c) + \Delta T_{IB,c} + \Delta T_{C,c} + \Delta T_{RxSRS}, P-MPR_c) \}$$

$$P_{CMAX_{H,f,c}} = \min \{ P_{EMAX,c}, P_{PowerClass} - \Delta P_{PowerClass} \}$$



where

$P_{\text{EMAX},c}$  is the value given by either the *p-Max* IE or the field *additionalPmax* of the *NR-NS-PmaxList* IE, whichever is applicable according to TS 38.331[7];

$P_{\text{PowerClass}}$  is the maximum UE power specified in Table 6.2.1-1 and in Table 6.2F.1-1 for shared spectrum access operation, without taking into account the tolerance specified in the Table 6.2.1-1 and in Table 6.2F.1-1 for shared spectrum access operation;

When the IE *powerBoostPi2BPSK* is set to 1,  $P_{\text{EMAX},c}$  is increased by +3 dB for a power class 3 UE operating in TDD bands n40, n41, n77, n78, and n79 with Pi/2 BPSK modulation with Rel-15 DMRS and UE indicates support for UE capability *powerBoosting-pi2BPSK* and 40% or less symbols in certain evaluation period are used for UL transmission when  $P_{\text{EMAX},c} \geq 20$  dBm (The exact evaluation period is no less than one radio frame).

When the IE *powerBoostPi2BPSK* is set to 1,  $\Delta P_{\text{PowerClass}} = -3$  dB for a power class 3 UE operating in TDD bands n40, n41, n77, n78, and n79 with Pi/2 BPSK modulation with Rel-15 DMRS and UE indicates support for UE capability *powerBoosting-pi2BPSK* and 40% or less slots in radio frame are used for UL transmission.

$\Delta P_{\text{PowerClass}} =$

- 3 dB for a power class 2 UE or 6 dB for a power class 1.5 UE when P-max of 23 dBm or lower is indicated; or when the field of UE capability *maxUplinkDutyCycle-PC2-FR1* is absent and the field of UE capability *maxUplinkDutyCycle-PC1dot5-MPE-FR1* is absent and the percentage of uplink symbols transmitted in a certain evaluation period is larger than 50%; or when the field of UE capability *maxUplinkDutyCycle-PC2-FR1* is not absent and the percentage of uplink symbols transmitted in a certain evaluation period is larger than *maxUplinkDutyCycle-PC2-FR1* as defined in TS 38.306 (The exact evaluation period is no less than one radio frame); or when the field of UE capability *maxUplinkDutyCycle-PC1dot5-MPE-FR1* is not absent and half the percentage of uplink symbols transmitted in a certain evaluation period is larger than *maxUplinkDutyCycle-PC1dot5-MPE-FR1* as defined in TS 38.306 (The exact evaluation period is no less than one radio frame).
- 3 dB for a power class 1.5 UE when P-max of between 23 dBm and 26 dB is indicated; or when the field of UE capability *maxUplinkDutyCycle-PC2-FR1* is absent and the field of UE capability *maxUplinkDutyCycle-PC1dot5-MPE-FR1* is absent and the percentage of uplink symbols transmitted in a certain evaluation period is between 25% and 50%; or when the field of UE capability *maxUplinkDutyCycle-PC2-FR1* is not absent and the percentage of uplink symbols transmitted in a certain evaluation period is between *maxUplinkDutyCycle-PC2-FR1* and *maxUplinkDutyCycle-PC2-FR1/2* as defined in TS 38.306 (The exact evaluation period is no less than one radio frame); or when the field of UE capability *maxUplinkDutyCycle-PC1dot5-MPE-FR1* is not absent and the percentage of uplink symbols transmitted in a certain evaluation period is larger than *maxUplinkDutyCycle-PC1dot5-MPE-FR1* as defined in TS 38.306 (The exact evaluation period is no less than one radio frame).
- 3dB when the UE is configured with SUL configurations and the requirements of default power class are applied as specified in sub-clause 6.2C.1 on the band where UE indicates power class 2;
- 3dB is applied during SRS transmission occasions with usage in SRS-ResourceSet set as 'antennaSwitching' with configured SRS resources in each SRS resource set(s) consisting of one SRS port when PC2 UE with txDiversity-r16 capability or PC1.5 UE further indicates SRS-TxSwitch capability 't1r2' or 't1r4' or 't1r1-t1r2' or 't1r1-t1r2-t1r4';
- 0 dB otherwise;

$\Delta T_{\text{IB},c}$  is the additional tolerance for serving cell c as specified in clause 6.2A.4.2 for NR CA, clause 6.2C.2 for SUL, or TS 38.101-3 clause 6.2B.4.2 for EN-DC;  $\Delta T_{\text{IB},c} = 0$  dB otherwise; In case the UE supports more than one of band combinations for V2X operating bands for concurrent operation, CA, SUL or DC, and an operating band belongs to more than one band combinations then

- a) When the operating band frequency range is  $\leq 1$  GHz, the applicable additional  $\Delta T_{\text{IB},c}$  shall be the average value for all band combinations defined in clause 6.2A.4.2, 6.2C.2 in this specification and 6.2B.4.2 in TS 38.101-3 [3], truncated to one decimal place that apply for that operating band among the supported band combinations. In case there is a harmonic relation between low band UL and high band DL, then the maximum  $\Delta T_{\text{IB},c}$  among the different supported band combinations involving such band shall be applied

- b) When the operating band frequency range is  $> 1$  GHz, the applicable additional  $\Delta T_{IB,c}$  shall be the maximum value for all band combinations defined in clause 6.2A.4.2, 6.2C.2 in this specification and 6.2B.4.2 in TS 38.101-3 [3] for the applicable operating bands.

$\Delta T_{C,c} = 1.5\text{dB}$  when NOTE 3 in Table 6.2.1-1 in 38.101-1 applies for a serving cell  $c$ , otherwise  $\Delta T_{C,c} = 0$  dB ;

$\text{MPR}_c$  and  $\text{A-MPR}_c$  for serving cell  $c$  are specified in clause 6.2.2 and clause 6.2.3, respectively and in clause 6.2F.2 and clause 6.2F.3 respectively for shared spectrum access operation;

$\Delta \text{MPR}_c$  for serving cell  $c$  is specified in clause 6.2.2 and in clause 6.2F.2 for shared spectrum access operation.

$\Delta T_{\text{RxSRS}}$  is applied during SRS transmission occasions with *usage* in *SRS-ResourceSet* set as 'antennaSwitching' when

- UE transmits SRS on the second SRS resource in every configured SRS resource set when the *SRS-TxSwitch* capability is indicated as 't1r2' or 't1r1-t1r2'
- UE transmits SRS on the second, third and fourth SRS resources of the total 4 SRS resources from all configured SRS resource set(s) consisting of one SRS port when the *SRS-TxSwitch* capability is indicated as 't1r4' or, 't1r4-t2r4' or 't1r1-t1r2-t1r4' or, 't1r1-t1r2-t2r2-t1r4-t2r4'
- UE transmits SRS from the SRS port pair on the second SRS resource in every configured SRS resource set consisting of two SRS ports when the *SRS-TxSwitch* capability is indicated as 't2r4' or 't1r4-t2r4', or 't1r1-t1r2-t2r2-t2r4' or 't1r1-t1r2-t2r2-t1r4-t2r4', or
- UE transmits SRS to a DL-only carrier

The value of  $\Delta T_{\text{RxSRS}}$  is 4.5dB for bands whose  $F_{\text{UL\_high}}$  is higher than the  $F_{\text{UL\_low}}$  of n79 and 3 dB for bands whose  $F_{\text{UL\_high}}$  is lower than the  $F_{\text{UL\_low}}$  of n79 when the device is power class 3 or power class 5 or power class 1.5 in the band, or when the device is power class 2 in the band and  $\Delta P_{\text{PowerClass}} = 3$  dB, or when UE indicating *txDiversity-r16*.

The value of  $\Delta T_{\text{RxSRS}}$  is 7.5dB for bands whose  $F_{\text{UL\_high}}$  is higher than the  $F_{\text{UL\_low}}$  of n79 and 6 dB for bands whose  $F_{\text{UL\_high}}$  is lower than the  $F_{\text{UL\_low}}$  of n79 during SRS transmission occasions with configured SRS resources consisting of one SRS port when the device is power class 2 in the band and  $\Delta P_{\text{PowerClass}} = 0$  dB and not indicating *txDiversity-r16*.

For other SRS transmissions  $\Delta T_{\text{RxSRS}}$  is zero;

$\text{P-MPR}_c$  is the power management maximum power reduction for

- ensuring compliance with applicable electromagnetic energy absorption requirements and addressing unwanted emissions / self desense requirements in case of simultaneous transmissions on multiple RAT(s) for scenarios not in scope of 3GPP RAN specifications;
- ensuring compliance with applicable electromagnetic energy absorption requirements in case of proximity detection is used to address such requirements that require a lower maximum output power.

The UE shall apply  $\text{P-MPR}_c$  for serving cell  $c$  only for the above cases. For UE conducted conformance testing  $\text{P-MPR}_c$  shall be 0 dB

NOTE 1:  $\text{P-MPR}_c$  was introduced in the  $P_{\text{CMAX},f,c}$  equation such that the UE can report to the gNB the available maximum output transmit power. This information can be used by the gNB for scheduling decisions.

NOTE 2:  $\text{P-MPR}_c$  may impact the maximum uplink performance for the selected UL transmission path.

$T_{\text{REF}}$  and  $T_{\text{eval}}$  are specified in Table 6.2.4-1. For each  $T_{\text{REF}}$ , the  $P_{\text{CMAX},L,c}$  for serving cell  $c$  are evaluated per  $T_{\text{eval}}$  and given by the minimum value taken over the transmission(s) within the  $T_{\text{eval}}$ ; the minimum  $P_{\text{CMAX},L,f,c}$  over one or more  $T_{\text{eval}}$  is then applied for the entire  $T_{\text{REF}}$

**Table 6.2.4-1: Evaluation and reference periods for P<sub>cm</sub>**

| $T_{\text{REF}}$ | $T_{\text{eval}}$ | $T_{\text{eval}}$ with frequency hopping |
|------------------|-------------------|------------------------------------------|
|------------------|-------------------|------------------------------------------|

|                         |                         |                                                                      |
|-------------------------|-------------------------|----------------------------------------------------------------------|
| Physical channel length | Physical channel length | $\text{Min}(T_{\text{no\_hopping}}, \text{Physical Channel Length})$ |
|-------------------------|-------------------------|----------------------------------------------------------------------|

The measured configured maximum output power  $P_{\text{UMAX},f,c}$  shall be within the following bounds:

$$P_{\text{CMAX},L,f,c} - \text{MAX}\{T_{L,c}, T(P_{\text{CMAX},L,f,c})\} \leq P_{\text{UMAX},f,c} \leq P_{\text{CMAX},H,f,c} + T(P_{\text{CMAX},H,f,c}).$$

where the tolerance  $T(P_{\text{CMAX},f,c})$  for applicable values of  $P_{\text{CMAX},f,c}$  is specified in Table 6.2.4-1. The tolerance  $T_{L,c}$  is the absolute value of the lower tolerance for the applicable operating band as specified in Table 6.2.1-1 and in Table 6.2F.1-1 for shared spectrum access operation.

**Table 6.2.4-1:  $P_{\text{CMAX}}$  tolerance**

| $P_{\text{CMAX},f,c}$ (dBm)         | Tolerance $T(P_{\text{CMAX},f,c})$ (dB) |
|-------------------------------------|-----------------------------------------|
| $23 < P_{\text{CMAX},c} \leq 33$    | 2.0                                     |
| $21 \leq P_{\text{CMAX},c} \leq 23$ | 2.0                                     |
| $20 \leq P_{\text{CMAX},c} < 21$    | 2.5                                     |
| $19 \leq P_{\text{CMAX},c} < 20$    | 3.5                                     |
| $18 \leq P_{\text{CMAX},c} < 19$    | 4.0                                     |
| $13 \leq P_{\text{CMAX},c} < 18$    | 5.0                                     |
| $8 \leq P_{\text{CMAX},c} < 13$     | 6.0                                     |
| $-40 \leq P_{\text{CMAX},c} < 8$    | 7.0                                     |

## 6.2A Transmitter power for CA

### 6.2A.0 General

As an exception, HPUE applicability notes in 5.5A do not restrict power class indication for single configured UL CC with DL CA. UE can indicate power class for the single configured UL CC with DL CA as specified in Table 6.2.1-1 and if UE supports UL MIMO in this carrier, UE can indicate power class for the CA configuration as specified in Table 6.2D.1-1.

### 6.2A.1 UE maximum output power for CA

#### 6.2A.1.1 UE maximum output power for Intra-band contiguous CA

For uplink intra-band contiguous carrier aggregation, the maximum output power is specified in Table 6.2A.1.1-1. For downlink intra-band contiguous carrier aggregation with a single uplink component carrier configured in the NR band, the maximum output power is specified in Table 6.2.1-1 for power class 3 and other power classes if indicated in clause 5.5A.1.

**Table 6.2A.1.1-1: UE Power Class for intra-band contiguous CA**

| NR CA Configuration                                                                                                                                                                                                                                                                                                  | Class 1 (dBm) | Tolerance (dB) | Class 2 (dBm) | Tolerance (dB) | Class 3 (dBm) | Tolerance (dB) | Class 5 (dBm) | Tolerance (dB) |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------|---------------|----------------|---------------|----------------|---------------|----------------|
| CA_n5B                                                                                                                                                                                                                                                                                                               |               |                |               |                | 23            | +2/-2          |               |                |
| CA_n7B                                                                                                                                                                                                                                                                                                               |               |                |               |                | 23            | +2/-2          |               |                |
| CA_n40B                                                                                                                                                                                                                                                                                                              |               |                |               |                | 23            | +2/-2          |               |                |
| CA_n41B                                                                                                                                                                                                                                                                                                              |               |                |               |                | 23            | +2/-2          |               |                |
| CA_n41C                                                                                                                                                                                                                                                                                                              |               |                | 26            | +2/-3          | 23            | +2/-2          |               |                |
| CA_n48B                                                                                                                                                                                                                                                                                                              |               |                |               |                | 23            | +2/-3          |               |                |
| CA_n77C                                                                                                                                                                                                                                                                                                              |               |                |               |                | 23            | +2/-3          |               |                |
| CA_n78C                                                                                                                                                                                                                                                                                                              |               |                | 26            | +2/-3          | 23            | +2/-3          |               |                |
| CA_n79C                                                                                                                                                                                                                                                                                                              |               |                |               |                | 23            | +2/-3          |               |                |
| NOTE 1: An uplink CA configuration in which the band has NOTE 3 in Table 6.2.1-1 is allowed to reduce the lower tolerance limit by 1.5 dB when the transmission bandwidths of the band are confined within $F_{\text{UL\_low}} + 4 \text{ MHz}$ or $F_{\text{UL\_high}} - 4 \text{ MHz}$ and $F_{\text{UL\_high}}$ . |               |                |               |                |               |                |               |                |
| NOTE 2: $P_{\text{PowerClass}}$ is the maximum UE power specified without taking into account the tolerance.                                                                                                                                                                                                         |               |                |               |                |               |                |               |                |

- NOTE 3: For intra-band contiguous carrier aggregation the maximum power requirement shall apply to the total transmitted power over all component carriers (per UE).
- NOTE 4: Power class 3 is the default power class unless otherwise stated.

If a UE supports a different power class than the default UE power class for the band combination listed in Table 6.2A.1.1-1 and the supported power class enables the higher maximum output power than that of the default power class:

- if the field of UE capability *maxUplinkDutyCycle-PC2-FR1* is absent and the percentage of total uplink symbols transmitted on all UL CCs in a certain evaluation period is larger than 50% (The exact evaluation period is no less than one radio frame); or
- if the field of UE capability *maxUplinkDutyCycle-PC2-FR1* is not absent and the percentage of total uplink symbols transmitted on all UL CCs in a certain evaluation period is larger than *maxUplinkDutyCycle-PC2-FR1* as defined in TS 38.306 (The exact evaluation period is no less than one radio frame); or
- if  $10 \log_{10} \sum P_{\text{EMAX},c}$  or  $P_{\text{EMAX},CA}$  which defined in clause 6.2A.4.1.1 is 23dBm or lower;
  - shall apply all requirements for the default power class to the supported power class and set the configured transmitted power as specified in clause 6.2A.4.1.1;
- else shall apply all requirements for the supported power class and set the configured transmitted power as specified in clause 6.2A.4.1.1.

### 6.2A.1.2 UE maximum output power for Intra-band non-contiguous CA

For intra-band non-contiguous carrier aggregation with one uplink carrier on the PCC, the requirements in clause 6.2.1 apply for power class 3 and other power classes if indicated in clause 5.5A.2. For intra-band non-contiguous carrier aggregation with two uplink carriers the maximum output power is specified in Table 6.2A.1.2-1.

**Table 6.2A.1.2-1: UE Power Class for intraband non-contiguous CA**

| NR CA Configuration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Class 1 (dBm) | Tolerance (dB) | Class 2 (dBm) | Tolerance (dB) | Class 3 (dBm) | Tolerance (dB) | Class 5 (dBm) | Tolerance (dB) |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------|---------------|----------------|---------------|----------------|---------------|----------------|
| CA_n41(2A)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |               |                | 26            | +2/-3          | 23            | +2/-3          |               |                |
| CA_n77(2A)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |               |                |               |                | 23            | +2/-3          |               |                |
| CA_n78(2A)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |               |                | 26            | +2/-3          | 23            | +2/-3          |               |                |
| NOTE 1: An uplink CA configuration in which the band has NOTE 3 in Table 6.2.1-1 is allowed to reduce the lower tolerance limit by 1.5 dB when the transmission bandwidths of the band are confined within $F_{UL\_low}$ and $F_{UL\_low} + 4 \text{ MHz}$ or $F_{UL\_high} - 4 \text{ MHz}$ and $F_{UL\_high}$ .<br>NOTE 2: $P_{\text{PowerClass}}$ is the maximum UE power specified without taking into account the tolerance.<br>NOTE 3: For intra-band non-contiguous carrier aggregation the maximum power requirement shall apply to the total transmitted power over all component carriers (per UE).<br>NOTE 4: Power class 3 is the default power class unless otherwise stated. |               |                |               |                |               |                |               |                |

If a UE supports a different power class than the default UE power class for the band combination listed in Table 6.2A.1.1-2 and the supported power class enables the higher maximum output power than that of the default power class:

- if the field of UE capability *maxUplinkDutyCycle-PC2-FR1* is absent and the percentage of total uplink symbols transmitted on all UL CCs in a certain evaluation period is larger than 50% (The exact evaluation period is no less than one radio frame); or
- if the field of UE capability *maxUplinkDutyCycle-PC2-FR1* is not absent and the percentage of total uplink symbols transmitted on all UL CCs in a certain evaluation period is larger than *maxUplinkDutyCycle-PC2-FR1* as defined in TS 38.306 (The exact evaluation period is no less than one radio frame); or
- if  $10 \log_{10} \sum P_{\text{EMAX},c}$  or  $P_{\text{EMAX},CA}$  which defined in clause 6.2A.4.1.2 is 23dBm or lower;
  - shall apply all requirements for the default power class to the supported power class and set the configured transmitted power as specified in clause 6.2A.4.1.2;

- else shall apply all requirements for the supported power class and set the configured transmitted power as specified in clause 6.2A.4.1.2.

### 6.2A.1.3 UE maximum output power for Inter-band CA

For inter-band downlink carrier aggregation with one uplink carrier assigned to one NR band, the transmitter power requirements in Table 6.2.1-1 apply for power class 3 and other power classes if indicated in clause 5.5A.3.

For inter-band carrier aggregation with two uplink contiguous carrier assigned to one NR band, the transmitter power requirements specified in subclause 6.2A.1.1 apply.

For inter-band carrier aggregation with two uplink non-contiguous carrier assigned to one NR band, the transmitter power requirements specified in subclause 6.2A.1.2 apply. For inter-band uplink carrier aggregation with uplink assigned to two NR bands, UE maximum output power shall be measured over all component carriers from different bands. If each band has separate antenna connectors, maximum output power is defined as the sum of maximum output power from each UE antenna connector. The period of measurement shall be at least one sub frame (1 ms). The maximum output power is specified in Table 6.2A.1.3-1.

**Table 6.2A.1.3-1 UE Power Class for uplink inter-band CA (two bands)**

| Uplink CA Configuration | Class 1 (dBm) | Tolerance (dB) | Class 2 (dBm)   | Tolerance (dB) | Class 3 (dBm) | Tolerance (dB) | Class 5 (dBm) | Tolerance (dB) |
|-------------------------|---------------|----------------|-----------------|----------------|---------------|----------------|---------------|----------------|
| CA_n1A-n3A              |               |                |                 |                | 23            | +2/-3          |               |                |
| CA_n1A-n5A              |               |                |                 |                | 23            | +2/-3          |               |                |
| CA_n1A-n7A              |               |                |                 |                | 23            | +2/-3          |               |                |
| CA_n1A-n8A              |               |                |                 |                | 23            | +2/-3          |               |                |
| CA_n1A-n18A             |               |                |                 |                | 23            | +2/-3          |               |                |
| CA_n1A-n20A             |               |                |                 |                | 23            | +2/-3          |               |                |
| CA_n1A-n28A             |               |                |                 |                | 23            | +2/-3          |               |                |
| CA_n1A-n40A             |               |                |                 |                | 23            | +2/-3          |               |                |
| CA_n1A-n41A             |               |                |                 |                | 23            | +2/-3          |               |                |
| CA_n1A-n74A             |               |                |                 |                | 23            | +2/-3          |               |                |
| CA_n1A-n77A             |               |                |                 |                | 23            | +2/-3          |               |                |
| CA_n1A-n78A             |               |                | 26 <sup>6</sup> | +2/-3          | 23            | +2/-3          |               |                |
| CA_n1A-n79A             |               |                |                 |                | 23            | +2/-3          |               |                |
| CA_n2A-n5A              |               |                |                 |                | 23            | +2/-3          |               |                |
| CA_n2A-n7A              |               |                |                 |                | 23            | +2/-3          |               |                |
| CA_n2A-n12A             |               |                |                 |                | 23            | +2/-3          |               |                |
| CA_n2A-n14A             |               |                |                 |                | 23            | +2/-3          |               |                |
| CA_n2A-n30A             |               |                |                 |                | 23            | +2/-3          |               |                |
| CA_n2A-n48A             |               |                |                 |                | 23            | +2/-3          |               |                |
| CA_n2A-n66A             |               |                |                 |                | 23            | +2/-3          |               |                |
| CA_n2A-n77A             |               |                | 26 <sup>6</sup> | +2/-3          | 23            | +2/-3          |               |                |
| CA_n2A-n78A             |               |                |                 |                | 23            | +2/-3          |               |                |
| CA_n3A-n5A              |               |                |                 |                | 23            | +2/-3          |               |                |
| CA_n3A-n7A              |               |                |                 |                | 23            | +2/-3          |               |                |
| CA_n3A-n8A              |               |                |                 |                | 23            | +2/-3          |               |                |
| CA_n3A-n18A             |               |                |                 |                | 23            | +2/-3          |               |                |
| CA_n3A-n20A             |               |                |                 |                | 23            | +2/-3          |               |                |
| CA_n3A-n28A             |               |                |                 |                | 23            | +2/-3          |               |                |
| CA_n3A-n34A             |               |                |                 |                | 23            | +2/-3          |               |                |
| CA_n3A-n38A             |               |                |                 |                | 23            | +2/-3          |               |                |
| CA_n3A-n40A             |               |                |                 |                | 23            | +2/-3          |               |                |
| CA_n3A-n41A             |               |                | 26 <sup>6</sup> | +2/-3          | 23            | +2/-3          |               |                |
| CA_n3A-n74A             |               |                |                 |                | 23            | +2/-3          |               |                |
| CA_n3A-n77A             |               |                |                 |                | 23            | +2/-3          |               |                |
| CA_n3A-n78A             |               |                | 26 <sup>6</sup> | +2/-3          | 23            | +2/-3          |               |                |
| CA_n3A-n79A             |               |                |                 |                | 23            | +2/-3          |               |                |
| CA_n5A-n7A              |               |                |                 |                | 23            | +2/-3          |               |                |
| CA_n5A-n12A             |               |                |                 |                | 23            | +2/-3          |               |                |
| CA_n5A-n14A             |               |                |                 |                | 23            | +2/-3          |               |                |

|              |  |                 |                    |    |       |  |  |
|--------------|--|-----------------|--------------------|----|-------|--|--|
| CA_n5A-n25A  |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n5A-n30A  |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n5A-n40A  |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n5A-n48A  |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n5A-n66A  |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n5A-n77A  |  | 26 <sup>6</sup> | +2/-3              | 23 | +2/-3 |  |  |
| CA_n5A-n78A  |  | 26 <sup>6</sup> | +2/-3              | 23 | +2/-3 |  |  |
| CA_n5A-n79A  |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n7A-n25A  |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n7A-n28A  |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n7A-n40A  |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n7A-n46A  |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n7A-n66A  |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n7A-n77A  |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n7A-n78A  |  | 26 <sup>6</sup> | +2/-3              | 23 | +2/-3 |  |  |
| CA_n8A-n34A  |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n8A-n39A  |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n8A-n40A  |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n8A-n41A  |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n8A-n77A  |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n8A-n78A  |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n8A-n79A  |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n12A-n30A |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n12A-n66A |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n12A-n77A |  | 26 <sup>6</sup> | +2/-3              | 23 | +2/-3 |  |  |
| CA_n13A-n25A |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n13A-n66A |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n13A-n77A |  | 26 <sup>6</sup> | +2/-3              | 23 | +2/-3 |  |  |
| CA_n14A-n30A |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n14A-n66A |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n14A-n77A |  | 26 <sup>6</sup> | +2/-3              | 23 | +2/-3 |  |  |
| CA_n18A-n28A |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n18A-n41A |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n18A-n74A |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n18A-n77A |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n18A-n78A |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n20A-n28A |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n20A-n78A |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n24A-n41A |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n24A-n48A |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n24A-n77A |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n25A-n38A |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n25A-n41A |  | 26 <sup>6</sup> | +2/-3 <sup>2</sup> | 23 | +2/-3 |  |  |
| CA_n25A-n48A |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n25A-n66A |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n25A-n71A |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n25A-n77A |  | 26 <sup>6</sup> | +2/-3              | 23 | +2/-3 |  |  |
| CA_n25A-n78A |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n26A-n66A |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n26A-n70A |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n28A-n34A |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n28A-n39A |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n28A-n40A |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n28A-n41A |  | 26 <sup>6</sup> | +2/-3              | 23 | +2/-3 |  |  |
| CA_n28A-n46A |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n28A-n50A |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n28A-n74A |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n28A-n77A |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n28A-n78A |  | 26 <sup>6</sup> | +2/-3              | 23 | +2/-3 |  |  |
| CA_n28A-n79A |  | 26 <sup>6</sup> | +2/-3              | 23 | +2/-3 |  |  |
| CA_n34A-n79A |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n30A-n66A |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n30A-n77A |  | 26 <sup>6</sup> | +2/-3              | 23 | +2/-3 |  |  |
| CA_n34A-n40A |  |                 |                    | 23 | +2/-3 |  |  |
| CA_n34A-n41A |  |                 |                    | 23 | +2/-3 |  |  |

|              |  |                 |       |    |       |  |  |
|--------------|--|-----------------|-------|----|-------|--|--|
| CA_n38A-n66A |  |                 |       | 23 | +2/-3 |  |  |
| CA_n38A-n78A |  |                 |       | 23 | +2/-3 |  |  |
| CA_n39A-n40A |  |                 |       | 23 | +2/-3 |  |  |
| CA_n39A-n41A |  |                 |       | 23 | +2/-3 |  |  |
| CA_n39A-n79A |  |                 |       | 23 | +2/-3 |  |  |
| CA_n40A-n41A |  | 26 <sup>8</sup> | +2/-3 | 23 | +2/-3 |  |  |
| CA_n40A-n77A |  |                 |       | 23 | +2/-3 |  |  |
| CA_n40A-n78A |  |                 |       | 23 | +2/-3 |  |  |
| CA_n40A-n79A |  |                 |       | 23 | +2/-3 |  |  |
| CA_n41A-n48A |  |                 |       | 23 | +2/-3 |  |  |
| CA_n41A-n50A |  |                 |       | 23 | +2/-3 |  |  |
| CA_n41A-n66A |  | 26 <sup>6</sup> | +2/-3 | 23 | +2/-3 |  |  |
| CA_n41A-n70A |  |                 |       | 23 | +2/-3 |  |  |
| CA_n41A-n71A |  | 26 <sup>6</sup> | +2/-3 | 23 | +2/-3 |  |  |
| CA_n41A-n74A |  |                 |       | 23 | +2/-3 |  |  |
| CA_n41A-n77A |  | 26 <sup>8</sup> | +2/-3 | 23 | +2/-3 |  |  |
| CA_n41A-n78A |  |                 |       | 23 | +2/-3 |  |  |
| CA_n41A-n79A |  | 26 <sup>8</sup> | +2/-3 | 23 | +2/-3 |  |  |
| CA_n46A-n48A |  |                 |       | 23 | +2/-3 |  |  |
| CA_n46A-n48B |  |                 |       | 23 | +2/-3 |  |  |
| CA_n46A-n78A |  |                 |       | 23 | +2/-3 |  |  |
| CA_n48A-n66A |  |                 |       | 23 | +2/-3 |  |  |
| CA_n48A-n70A |  |                 |       | 23 | +2/-3 |  |  |
| CA_n48A-n71A |  |                 |       | 23 | +2/-3 |  |  |
| CA_n48A-n96A |  |                 |       | 23 | +2/-3 |  |  |
| CA_n48B-n96A |  |                 |       | 23 | +2/-3 |  |  |
| CA_n48A-n96B |  |                 |       | 23 | +2/-3 |  |  |
| CA_n50A-n78A |  |                 |       | 23 | +2/-3 |  |  |
| CA_n66A-n71A |  |                 |       | 23 | +2/-3 |  |  |
| CA_n66A-n77A |  | 26 <sup>6</sup> | +2/-3 | 23 | +2/-3 |  |  |
| CA_n66A-n78A |  |                 |       | 23 | +2/-3 |  |  |
| CA_n70A-n71A |  |                 |       | 23 | +2/-3 |  |  |
| CA_n70A-n78A |  |                 |       | 23 | +2/-3 |  |  |
| CA_n71A-n77A |  | 26 <sup>6</sup> | +2/-3 | 23 | +2/-3 |  |  |
| CA_n71A-n78A |  |                 |       | 23 | +2/-3 |  |  |
| CA_n74A-n77A |  |                 |       | 23 | +2/-3 |  |  |
| CA_n74A-n78A |  |                 |       | 23 | +2/-3 |  |  |
| CA_n77A-n79A |  |                 |       | 23 | +2/-3 |  |  |
| CA_n78A-n79A |  |                 |       | 23 | +2/-3 |  |  |
| CA_n78A-n92A |  |                 |       | 23 | +2/-3 |  |  |

NOTE 1: Void

NOTE 2: An uplink CA configuration in which at least one of the bands has NOTE 3 in Table 6.2.1-1 is allowed to reduce the lower tolerance limit by 1.5 dB when the transmission bandwidths of at least one of the bands is confined within  $F_{UL\_low}$  and  $F_{UL\_low} + 4$  MHz or  $F_{UL\_high} - 4$  MHz and  $F_{UL\_high}$ .

NOTE 3:  $P_{PowerClass}$  is the maximum UE power specified without taking into account the tolerance

NOTE 4: For inter-band carrier aggregation the maximum power requirement should apply to the total transmitted power over all component carriers (per UE).

NOTE 5: Power class 3 is the default power class unless otherwise stated.

NOTE 6: The UE supports PC3 within NR FDD band, and supports either PC3 or PC2 within NR TDD band.

NOTE 7: The UE that supports a PC2 uplink CA configuration with single carrier for each individual band and a composite of supporting PC3 within an NR TDD or FDD band and PC2 within a second NR TDD band may signal a *higherPowerLimit-r17* capability whereby the maximum output power indicated in the table may be exceeded in accordance with sub-clause 6.2A.4.1.3. The power classes referenced are according to the reported *ue-PowerClassPerBandPerBC-r17* if indicated or *ue-PowerClass* otherwise.

NOTE 8: The UE supports either PC3 or PC2 within each NR TDD band.

If a UE supports a different power class than the default UE power class for the band combination listed in Table 6.2A.1.3-1 and the supported power class enables the higher maximum output power than that of the default power class:

- if the field of UE capability *maxUplinkDutyCycle-interBandCA-PC2* is not absent and the average percentage of uplink symbols transmitted in a certain evaluation period is larger than *maxUplinkDutyCycle-interBandCA-PC2* as defined in TS 38.331 (The exact evaluation period is no less than one radio frame); or
- if  $10 \log_{10} \sum P_{EMAX,c}$  or  $P_{EMAX,CA}$  which defined in clause 6.2A.4.1.3 is 23dBm or lower;

- shall apply all requirements for the default power class to the supported power class and set the configured transmitted power as specified in clause 6.2A.4.1.3;
- else;
- shall apply all requirements for the supported power class and set the configured transmitted power as specified in clause 6.2A.4.1.3 (regardless of the average percentage of uplink symbols if the field of UE capability *maxUplinkDutyCycle-interBandCA-PC2* is absent).

The average percentage of uplink symbols is defined as  $50\% \times (\text{Duty}_{\text{NR},x} / \text{maxDuty}_{\text{NR},x} + \text{Duty}_{\text{NR},y} / \text{maxDuty}_{\text{NR},y})$ .  $\text{Duty}_{\text{NR},x}$ ,  $\text{Duty}_{\text{NR},y}$  represent the actual percentage of uplink symbols transmitted in the same evaluation period (The exact evaluation period is no less than one radio frame) for NR Band x, NR Band y respectively;  $\text{maxDuty}_{\text{NR},x}$ ,  $\text{maxDuty}_{\text{NR},y}$  represent the field of UE capability *maxUplinkDutyCycle-PC2-FR1* per band as defined in TS 38.331. For NR Band x or NR Band y,

- if power class of one or both of the bands within the band combination is power class 2 and the corresponding UE capability *maxUplinkDutyCycle-PC2-FR1* is absent;
- the corresponding  $\text{maxDuty}_{\text{NR},x}$  or  $\text{maxDuty}_{\text{NR},y}$  is equal to 50%;
- else if the band is configured with power class 3;
- the corresponding  $\text{maxDuty}_{\text{NR},x}$  or  $\text{maxDuty}_{\text{NR},y}$  is equal to 100%.

**Table 6.2A.1.3-2 Void**

6.2A.1.4 Void

6.2A.1.5 Void

## 6.2A.2 UE maximum output power reduction for CA

### 6.2A.2.1 UE maximum output power reduction for Intra-band contiguous CA

For intra-band contiguous carrier aggregation the allowed Maximum Power Reduction (MPR) for the maximum output power in 6.2A.1.1-1 with contiguous RB allocation is specified in Table 6.2A.2.1-1 for UE power class 3 CA bandwidth classes B and C. The MPR with contiguous RB allocation is specified in Table 6.2A.2.1-1a for power class 2 CA bandwidth classes B and C when the signalling is absent for *dualPA-Architecture* IE, and for power class 2 CA bandwidth classe C when the signalling is indicated for *dualPA-Architecture* IE. The MPR with contiguous RB allocation is specified in Table 6.2A.2.1-1b for power class 2 CA bandwidth classes B and C with TxD supported.

In case the modulation format or waveform type is different on different component carriers then the requirement is set by rules applied to the waveform type (DFT-s-OFDM or CP-OFDM) and modulation order used in the configuration with the largest MPR.

Unless otherwise specified, pi/2 BPSK in following MPR tables refers to both variants of pi/2 BPSK referenced in clause 6.2.2 Table 6.2.2-1.

**Table 6.2A.2.1-1: Contiguous RB allocation for Power Class 3**

| Modulation |           | MPR for bandwidth class B(dB) |       | MPR for bandwidth class C(dB) |       |
|------------|-----------|-------------------------------|-------|-------------------------------|-------|
|            |           | inner                         | outer | inner                         | outer |
| DFT-s-OFDM | Pi/2 BPSK | 1.0                           | 3.5   | 2.5                           | 7     |
|            | QPSK      | 1.0                           | 3.5   | 2.5                           | 7     |
|            | 16QAM     | 1.5                           | 3.5   | 2.5                           | 7     |
|            | 64QAM     | 3.0                           | 4.0   | 5                             | 7     |
|            | 256QAM    | 5.5                           | 6.0   | 7                             | 7.5   |
| CP-OFDM    | QPSK      | 2.0                           | 4.0   | 3.5                           | 8     |



|  |        |     |     |     |   |
|--|--------|-----|-----|-----|---|
|  | 16QAM  | 2.5 | 4.0 | 3.5 | 8 |
|  | 64QAM  | 3.5 | 4.0 | 5   | 8 |
|  | 256QAM | 6.5 | 6.5 | 7   | 8 |

Table 6.2A.2.1-1a: Contiguous RB allocation for Power Class 2

| Modulation |           | MPR for bandwidth class B(dB) |                    | MPR for bandwidth class C(dB) |       |
|------------|-----------|-------------------------------|--------------------|-------------------------------|-------|
|            |           | inner                         | Outer <sup>1</sup> | inner                         | outer |
| DFT-s-OFDM | Pi/2 BPSK | 2.0                           | 4.0 <sup>1</sup>   | 2.5                           | 7     |
|            | QPSK      | 2.0                           | 4.0 <sup>1</sup>   | 2.5                           | 7     |
|            | 16QAM     | 2.5                           | 4.0 <sup>1</sup>   | 2.5                           | 7     |
|            | 64QAM     | 3.0                           | 4.5 <sup>1</sup>   | 5                             | 7     |
|            | 256QAM    | 5.5                           | 6.0                | 7                             | 7.5   |
| CP-OFDM    | QPSK      | 2.5                           | 5.0 <sup>1</sup>   | 3.5                           | 8     |
|            | 16QAM     | 3.0                           | 5.0 <sup>1</sup>   | 3.5                           | 8     |
|            | 64QAM     | 3.5                           | 5.0 <sup>1</sup>   | 5                             | 8     |
|            | 256QAM    | 6.5                           | 6.5                | 7                             | 8     |

NOTE 1: When 1 RB or 2 RB are allocated at the lower edge of lowest CC or upper edge of upper CC, MPR for outer is 5.5 dB.

Table 6.2A.2.1-1b: Contiguous RB allocation for Power Class 2 with 2Tx<sup>2</sup>

| Modulation |           | MPR for bandwidth class B(dB) |                    | MPR for bandwidth class C(dB) |       |
|------------|-----------|-------------------------------|--------------------|-------------------------------|-------|
|            |           | inner                         | Outer <sup>1</sup> | inner                         | outer |
| DFT-s-OFDM | Pi/2 BPSK | 3.0                           | 5.0 <sup>1</sup>   | 3.5                           | 8     |
|            | QPSK      | 3.0                           | 5.0 <sup>1</sup>   | 3.5                           | 8     |
|            | 16QAM     | 3.5                           | 5.0 <sup>1</sup>   | 3.5                           | 8     |
|            | 64QAM     | 4.0                           | 5.5 <sup>1</sup>   | 6                             | 8     |
|            | 256QAM    | 6.5                           | 7.0                | 8                             | 8.5   |
| CP-OFDM    | QPSK      | 3.0                           | 5.5 <sup>1</sup>   | 4.0                           | 8.5   |
|            | 16QAM     | 3.5                           | 5.5 <sup>1</sup>   | 4.0                           | 8.5   |
|            | 64QAM     | 4.0                           | 5.5 <sup>1</sup>   | 5.5                           | 8.5   |
|            | 256QAM    | 7.0                           | 7.0                | 7.5                           | 8.5   |

NOTE 1: When 1 RB or 2 RB are allocated at the lower edge of lowest CC or upper edge of upper CC, MPR for outer is 5.5 dB.  
NOTE 2: UE indicating Tx2 supported

For CA bandwidth class B and bandwidth class C with contiguous RB allocation, the following parameters are defined to specify valid RB allocation ranges for Inner and Outer RB allocations:

An RB allocation is contiguous if  $L_{CRB1} = 0$  or  $L_{CRB2} = 0$  or ( $L_{CRB1} \neq 0$  and  $L_{CRB2} \neq 0$  and  $RB_{Start1} + L_{CRB1} = N_{RB1}$  and  $RB_{Start2} = 0$ ), where  $RB_{Start1}$ ,  $L_{CRB1}$ , and  $N_{RB1}$  are for CC1,  $RB_{Start2}$ ,  $L_{CRB2}$ , and  $N_{RB2}$  are for CC2, CC1 is the component carrier with lower frequency.

In contiguous CA, a contiguous allocation is an inner allocation if

$$RB_{Start,Low} \leq RB_{Start,CA} \leq RB_{Start,High}, \text{ and } N_{RB,alloc} \leq \text{ceil}(N_{RB,agg}/2),$$

where

$$RB_{Start,Low} = \max(1, \text{floor}(N_{RB,alloc}/2))$$

$$RB_{Start,High} = N_{RB,agg} - RB_{Start,Low} - N_{RB,alloc},$$

with

$$N_{RB,alloc} = L_{CRB1} \cdot 2^{\mu_1} + L_{CRB2} \cdot 2^{\mu_2},$$

$$N_{RB,agg} = N_{RB1} \cdot 2^{\mu_1} + N_{RB2} \cdot 2^{\mu_2}.$$

$$\text{If } L_{CRB1} = 0, RB_{Start,CA} = N_{RB1} \cdot 2^{\mu_1} + RB_{Start2} \cdot 2^{\mu_2},$$

$$\text{if } L_{CRB1} > 0, RB_{Start,CA} = RB_{Start1} \cdot 2^{\mu_1}.$$

A contiguous allocation that is not an Inner contiguous allocation is an Outer contiguous allocation.

For intra-band contiguous carrier aggregation the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2A.1.1-1 with non-contiguous RB allocation is specified in Table 6.2A.2.1-2 for UE power class 3 CA bandwidth classes B and C. The MPR with non-contiguous RB allocation is specified in Table 6.2A.2.1-3 for power class 2 CA bandwidth classes B and C when the signalling is absent for *dualPA-Architecture* IE, and for power class 2 CA bandwidth classe C when the signalling is indicated for *dualPA-Architecture* IE. The MPR with non-contiguous RB allocation is specified in Table 6.2A.2.1-4 for power class 2 CA bandwidth classes B and C with TxD supported.

**Table 6.2A.2.1-2: non-contiguous RB allocation for Power Class 3**

| Modulation |           | MPR for bandwidth class B(dB) |                     |                     | MPR for bandwidth class C(dB) |                     |                     |
|------------|-----------|-------------------------------|---------------------|---------------------|-------------------------------|---------------------|---------------------|
|            |           | inner                         | Outer1 <sup>1</sup> | Outer2 <sup>2</sup> | inner                         | Outer1 <sup>1</sup> | Outer2 <sup>2</sup> |
| DFT-s-OFDM | Pi/2 BPSK | 2                             | 5.5                 | 11.5                | 2.5                           | 6                   | 13                  |
|            | QPSK      | 2                             | 5.5                 |                     | 2.5                           | 6                   |                     |
|            | 16QAM     | 2.5                           | 5.5                 |                     | 3                             | 6                   |                     |
|            | 64QAM     | 4.5                           | 6                   |                     | 5                             | 6                   |                     |
|            | 256QAM    | 6                             | 6.5                 |                     | 6.5                           | 6.5                 |                     |
| CP-OFDM    | QPSK      | 2.5                           | 6.5                 | 12                  | 3.5                           | 7                   | 14                  |
|            | 16QAM     | 3                             | 7                   |                     | 3.5                           | 7                   |                     |
|            | 64QAM     | 5                             | 7                   |                     | 5                             | 7                   |                     |
|            | 256QAM    | 7.5                           | 7.5                 |                     | 7.5                           | 7.5                 |                     |

NOTE 1: Outer 1 MPR for Pi/2 BPSK and QPSK is reduced by 2dB for aggregated allocation bandwidth > 10MHz  
NOTE 2: Outer 2 MPR is reduced by 4.5dB for aggregated allocation bandwidth > 10MHz

**Table 6.2A.2.1-3: non-contiguous RB allocation for Power Class 2**

| Modulation |           | MPR for bandwidth class B(dB) |                     |                     | MPR for bandwidth class C(dB) |                     |                     |
|------------|-----------|-------------------------------|---------------------|---------------------|-------------------------------|---------------------|---------------------|
|            |           | inner                         | Outer1 <sup>2</sup> | Outer2 <sup>3</sup> | Inner                         | Outer1 <sup>2</sup> | Outer2 <sup>3</sup> |
| DFT-s-OFDM | Pi/2 BPSK | 3 <sup>1</sup>                | 6.5                 | 13                  | 3 <sup>1</sup>                | 7.5                 | 13.5                |
|            | QPSK      | 3 <sup>1</sup>                | 6.5                 |                     | 3 <sup>1</sup>                | 7.5                 |                     |
|            | 16QAM     | 3 <sup>1</sup>                | 6.5                 |                     | 3 <sup>1</sup>                | 7.5                 |                     |
|            | 64QAM     | 5                             | 6.5                 |                     | 5                             | 7.5                 |                     |
|            | 256QAM    | 6.5                           | 7                   |                     | 6.5                           | 7.5                 |                     |
| CP-OFDM    | QPSK      | 3.5 <sup>1</sup>              | 7                   | 14                  | 3.5 <sup>1</sup>              | 8                   | 14.5                |
|            | 16QAM     | 3.5 <sup>1</sup>              | 7                   |                     | 3.5 <sup>1</sup>              | 8                   |                     |
|            | 64QAM     | 5                             | 7                   |                     | 5                             | 8                   |                     |
|            | 256QAM    | 7.5                           | 7.5                 |                     | 7.5                           | 8                   |                     |

NOTE 1: the allowed MPR is [4]dB for aggregated allocation bandwidth < [2MHz].  
NOTE 2: Outer 1 MPR for Pi/2 BPSK and QPSK is reduced by 2dB for aggregated allocation bandwidth > 10MHz  
NOTE 3: Outer 2 MPR is reduced by 4.5dB for aggregated allocation bandwidth > 10MHz

**Table 6.2A.2.1-4: non-contiguous RB allocation for Power Class 2 with 2Tx<sup>4</sup>**

| Modulation |           | MPR for bandwidth class B(dB) |                     |                     | MPR for bandwidth class C(dB) |                     |                     |
|------------|-----------|-------------------------------|---------------------|---------------------|-------------------------------|---------------------|---------------------|
|            |           | inner                         | Outer1 <sup>2</sup> | Outer2 <sup>3</sup> | Inner                         | Outer1 <sup>2</sup> | Outer2 <sup>3</sup> |
| DFT-s-OFDM | Pi/2 BPSK | 4 <sup>1</sup>                | 7.5                 | 14                  | 4 <sup>1</sup>                | 8.5                 | 14.5                |
|            | QPSK      | 4 <sup>1</sup>                | 7.5                 |                     | 4 <sup>1</sup>                | 8.5                 |                     |
|            | 16QAM     | 4 <sup>1</sup>                | 7.5                 |                     | 4 <sup>1</sup>                | 8.5                 |                     |
|            | 64QAM     | 6                             | 7.5                 |                     | 6                             | 8.5                 |                     |
|            | 256QAM    | 7.5                           | 8                   |                     | 7.5                           | 8.5                 |                     |
| CP-OFDM    | QPSK      | 4.5 <sup>1</sup>              | 8                   | 15                  | 4.5 <sup>1</sup>              | 9                   | 15.5                |
|            | 16QAM     | 4.5 <sup>1</sup>              | 8                   |                     | 4.5 <sup>1</sup>              | 9                   |                     |
|            | 64QAM     | 6                             | 8                   |                     | 6                             | 9                   |                     |
|            | 256QAM    | 8.5                           | 8.5                 |                     | 8.5                           | 9                   |                     |

NOTE 1: the allowed MPR is [4]dB for aggregated allocation bandwidth < [2MHz].  
NOTE 2: Outer 1 MPR for Pi/2 BPSK and QPSK is reduced by 2dB for aggregated allocation bandwidth > 10MHz  
NOTE 3: Outer 2 MPR is reduced by 4.5dB for aggregated allocation bandwidth > 10MHz  
NOTE 4: UE indicating TxD supported

For CA bandwidth classes B and C with non-contiguous RB allocation, the following parameters are defined to specify valid RB allocation ranges for Inner, Outer1 and Outer2 RB allocations:

Non-Contiguous RB allocation is defined as  $RB_{Start1} + L_{CRB1} < N_{RB1}$ , or  $RB_{Start2} > 0$ , when both uplink CCs are activated and allocated with RB(s), where  $RB_{Start1}$ ,  $L_{CRB1}$ , and  $N_{RB1}$  are for CC1,  $RB_{Start2}$ ,  $L_{CRB2}$ , and  $N_{RB2}$  are for CC2, CC1 is the component carrier with lower frequency.

In contiguous CA, a non-contiguous RB allocation is a non-contiguous Inner RB allocation if the following conditions are met:

$$RB_{Start,Low} \leq RB_{Start\_CA} \leq RB_{Start,High} \text{ and } N_{RB\_alloc} \leq \text{ceil}((BW_{Channel\_CA} / 3 - BW_{gap}) / 0.18\text{MHz}),$$

where

$$N_{RB\_alloc} = (N_{RB1} - RB_{Start1}) \cdot 2^{\mu_1} + (RB_{Start2} + L_{CRB2}) \cdot 2^{\mu_2}, RB_{Start\_CA} = RB_{Start1} \cdot 2^{\mu_1}$$

$$RB_{Start,Low} = \max(1, \text{floor}(N_{RB\_alloc} + (BW_{gap} - BW_{GB,low}) / 0.18\text{MHz}))$$

$$RB_{Start,High} = \text{floor}((BW_{Channel\_CA} - 2 \cdot BW_{gap} - BW_{GB,low}) / 0.18\text{MHz} - 2 \cdot N_{RB\_alloc})$$

$$BW_{GB,low} = F_{offset,low} - (N_{RB1} \cdot 12 + 1) \cdot SCS_1 / 2$$

$BW_{gap}$  is the bandwidth of the gap between the upper edge of the Transmission Bandwidth Configuration  $N_{RB1}$  of CC1 and the lower edge of the Transmission Bandwidth Configuration  $N_{RB2}$  of CC2.

In contiguous CA, a non-contiguous RB allocation is a non-contiguous outer 1 RB allocation when it is not satisfying inner allocation conditions and when the following conditions are met:

$$RB_{Start,Low} \leq RB_{Start\_CA} \leq RB_{Start,High} \text{ and } N_{RB\_alloc} \leq \text{ceil}((3 BW_{Channel\_CA} / 5 - BW_{gap}) / 0.18\text{MHz})$$

where

$$RB_{Start,Low} = \max(1, 2 \cdot N_{RB\_alloc} - \text{floor}((BW_{Channel\_CA} - 2 \cdot BW_{gap} + BW_{GB,low}) / 0.18\text{MHz})),$$

$$RB_{Start,High} = \text{floor}((2 \cdot BW_{Channel\_CA} - 3 \cdot BW_{gap} - BW_{GB,low}) / 0.18\text{MHz} - 3 \cdot N_{RB\_alloc})$$

$N_{RB\_alloc}$ ,  $RB_{Start\_CA}$ ,  $BW_{gap}$  and  $BW_{GB,low}$  are as defined for the Inner region.

In contiguous CA, a non-contiguous allocation is an Outer 2 allocation if it is neither a non-contiguous Inner allocation nor an Outer 1 allocation.

## 6.2A.2.2 UE maximum output power reduction for Intra-band non-contiguous CA

### 6.2A.2.2.0 General

For intra-band non-contiguous CA, the allowed Maximum Power Reduction (MPR) for the maximum output power is specified into 2 types: MPR to meet -30dBm/MHz and -13dBm/MHz. The UE determines the MPR type as follows:

For UE indicating *dualPA-Architecture* supported

If OR ( $L_{CRB1} = 0$ ,  $L_{CRB2} = 0$ )

MPR defined in Table 6.2.2-1 and Table 6.2.2-2 for PC3 and PC2 UE respectively

Else If AND(  $F_{IM3,low\_block,low} > SEM_{-13,low}$ ,  $F_{IM3,high\_block,high} < SEM_{-13,high}$  )

MPR defined in Clause 6.2A.2.2.2.1 and Clause 6.2A.2.2.2.2 for PC3 and PC2 UE respectively.

Else

MPR defined in Clause 6.2A.2.2.1.1 and Clause 6.2A.2.2.1.2 for PC3 and PC2 UE respectively.

For UE without indicating *dualPA-Architecture* supported

If OR(  $L_{CRB1} = 0$ ,  $L_{CRB2} = 0$  )

For PC3 UE, MPR defined in Table 6.2.2-1, except for  $B < 9$  MHz where 5.5 dB MPR is used;

For PC2 UE without indicating  $TxD$ , MPR defined in Table 6.2.2-2 is used, except for  $B < 11.52$  MHz where 6.5 dB MPR is used;

For PC2 UE indicating  $TxD$ , MPR defined in Table 6.2D.2-1 is used, except for  $B < 11.52$  MHz where the maximum value between 6.5 dB and MPR defined in Table 6.2D.2-1 is used.

Else If AND(  $F_{IM3,low\_block,low} > SEM_{-13,low}$ ,  $F_{IM3,high\_block,high} < SEM_{-13,high}$  )

MPR defined in Clause 6.2A.2.2.2.3 and Clause 6.2A.2.2.2.4 for PC3 and PC2 UE respectively.

Else

MPR defined in Clause 6.2A.2.2.1.3 and Clause 6.2A.2.2.1.4 for PC3 and PC2 UE respectively.

where

- $L_{CRB1}$  is for CC1 which is the component carrier with lower frequency
- $L_{CRB2}$  is for CC2 which is the component carrier with higher frequency
- $B = (L_{CRB1} * 12 * SCS_1 + L_{CRB2} * 12 * SCS_2) / 1,000$
- $F_{IM3,high\_block,high} = (2 * F_{high\_alloc,high\_edge}) - F_{low\_alloc,low\_edge}$
- $F_{IM3,low\_block,low} = (2 * F_{low\_alloc,low\_edge}) - F_{high\_alloc,high\_edge}$
- $F_{low\_alloc,low\_edge}$  is the lowermost frequency of the lower transmission bandwidth allocation.
- $F_{low\_alloc,high\_edge}$  is the uppermost frequency of the lower transmission bandwidth allocation.
- $F_{high\_alloc,low\_edge}$  is the lowermost frequency of the upper transmission bandwidth allocation.
- $F_{high\_alloc,high\_edge}$  is the uppermost frequency of the upper transmission bandwidth allocation.
- $SEM_{-13,low}$  = Threshold frequency where lower spectral emission mask below the lower channel drops from -13 dBm / MHz to -25 dBm / MHz, as specified in Clause 6.5A.2.2.2.
- $SEM_{-13,high}$  = Threshold frequency where upper spectral emission mask above the upper channel drops from -13 dBm / MHz to -25 dBm / MHz, as specified in Clause 6.5A.2.2.2.

MPRs in section 6.2A.2.2.1.3, 6.2A.2.2.1.4, 6.2A.2.2.2.3 and 6.2A.2.2.2.4 are applicable only when the Gap between the component carriers is  $\leq$  the overall channel bandwidth summed across all the component carriers and when UE declares *intraBandFreqSeparationUL-AggBW-GapBW-r16* value  $\leq 200$  MHz.

The definition of the gap is between the component carriers in a spectrum that is not part of any configured component carrier that is located in between the lowest edge of the component carrier with higher center frequency and the highest edge of the component carrier with center frequency that is located lower in frequency.

## 6.2A.2.2.1 MPR to meet -30dBm/MHz

### 6.2A.2.2.1.1 PC3 with indicating dualPA-Architecture supported

MPR in this clause is for intra-band non-contiguous CA power class 3 for UEs indicating IE *dualPA-Architecture* supported. The allowed maximum output power reduction is defined as:

$MPR = M_A$  Where  $M_A$  is defined as follows

$$M_A = 15; \quad 0 \leq B < 1.08$$

|       |                        |
|-------|------------------------|
| 14.5; | $1.08 \leq B < 2.16$   |
| 13.5; | $2.16 \leq B < 3.24$   |
| 12.5; | $3.24 \leq B < 5.04$   |
| 11.5; | $5.04 \leq B < 10.08$  |
| 10.5; | $10.08 \leq B < 16.38$ |
| 10;   | $16.38 \leq B < 21.78$ |
| 9;    | $21.78 \leq B$         |

#### 6.2A.2.2.1.2 PC2 with indicating dualPA-Architecture supported

MPR in this clause is for intra-band non-contiguous CA power class 2 for UEs indicating IE *dualPA-Architecture* supported. The allowed maximum output power reduction is defined as:

MPR= $M_A$  Where  $M_A$  is defined as follows

|         |       |                       |
|---------|-------|-----------------------|
| $M_A =$ | 15.5; | $0 \leq B < 1.44$     |
|         | 15.0; | $1.44 \leq B < 2.88$  |
|         | 14.0; | $2.88 \leq B < 5.76$  |
|         | 12.0; | $5.76 \leq B < 10.8$  |
|         | 10.5; | $10.8 \leq B < 23.04$ |
|         | 9.0;  | $23.04 \leq B$        |

#### 6.2A.2.2.1.3 PC3 without indicating dualPA-Architecture supported

MPR in this clause is for intra-band non-contiguous CA power class 3 for UEs without indicating IE *dualPA-Architecture* supported. The allowed maximum output power reduction is defined as:

MPR= $M_A$  Where  $M_A$  is defined as follows

|         |       |                       |
|---------|-------|-----------------------|
| $M_A =$ | 17.5; | $0 \leq B < 1.08$     |
|         | 17.0; | $1.08 \leq B < 2.16$  |
|         | 16.5; | $2.16 \leq B < 3.24$  |
|         | 16;   | $3.24 \leq B < 5.04$  |
|         | 15;   | $5.04 \leq B < 10.08$ |
|         | 14.5; | $10.08 \leq B < 36$   |
|         | 10;   | $36 \leq B < 56.88$   |
|         | 9;    | $56.88 \leq B$        |

#### 6.2A.2.2.1.4 PC2 without indicating dualPA-Architecture supported

MPR in this clause is for intra-band non-contiguous CA power class 2 for UEs without indicating IE *dualPA-Architecture* supported. The allowed maximum output power reduction is defined as:

$\text{MPR} = M_A$  Where  $M_A$  is defined as follows

$$M_A = \begin{array}{ll} 19.5; & 0 \leq B < 1.08 \\ 19; & 1.08 \leq B < 2.16 \\ 18; & 2.16 \leq B < 5.04 \\ 16.5; & 5.04 \leq B < 10.08 \\ 16; & 10.08 \leq B < 36 \\ 12; & 36 \leq B < 56.88 \\ 10.5; & 56.88 \leq B \end{array}$$

#### 6.2A.2.2.2 MPR to meet -13dBm/MHz

##### 6.2A.2.2.2.1 PC3 with indicating dualPA-Architecture supported

MPR in this clause is for intra-band non-contiguous CA power class 3 for UEs indicating IE *dualPA-Architecture* supported. The allowed maximum output power reduction is defined as:

$$\text{MPR} = M_A$$

Where  $M_A$  is defined as follows

$$M_A = \begin{array}{ll} 9 & ; \quad 0 \leq B < 0.54 \\ 8 & ; \quad 0.54 \leq B < 1.08 \\ 7 & ; \quad 1.08 \leq B < 2.16 \\ 6.5 & ; \quad 2.16 \leq B < 3.24 \\ 5.5 & ; \quad 3.24 \leq B < 5.4 \\ 4 & ; \quad 5.4 \leq B \end{array}$$

##### 6.2A.2.2.2.2 PC2 with indicating dualPA-Architecture supported

MPR in this clause is for intra-band non-contiguous CA power class 2 for UEs indicating IE *dualPA-Architecture* supported. The allowed maximum output power reduction is defined as:

$$\text{MPR} = M_A$$

Where  $M_A$  is defined as follows

$$M_A = \begin{array}{ll} 9 & ; \quad 0 \leq B < 0.54 \\ 8 & ; \quad 0.54 \leq B < 1.08 \\ 7 & ; \quad 1.08 \leq B < 2.16 \\ 6.5 & ; \quad 2.16 \leq B < 3.24 \\ 6 & ; \quad 3.24 \leq B < 5.4 \\ 5.5 & ; \quad 5.4 \leq B \leq 10.8 \\ 4 & ; \quad 10.8 < B \end{array}$$

#### 6.2A.2.2.2.3 PC3 without indicating dualPA-Architecture supported

MPR in this clause is for intra-band non-contiguous CA power class 3 for UEs without indicating IE *dualPA-Architecture* supported. The allowed maximum output power reduction is defined as:

$MPR = M_A$  Where  $M_A$  is defined as follows

|         |       |                       |
|---------|-------|-----------------------|
| $M_A =$ | 11;   | $0 \leq B < 1.08$     |
|         | 10.5; | $1.08 \leq B < 2.16$  |
|         | 10;   | $2.16 \leq B < 3.24$  |
|         | 9.5;  | $3.24 \leq B < 5.04$  |
|         | 8.5;  | $5.04 \leq B < 10.08$ |
|         | 7.5;  | $10.08 \leq B < 36$   |
|         | 7;    | $36 \leq B$           |

#### 6.2A.2.2.2.4 PC2 without indicating dualPA-Architecture supported

MPR in this clause is for intra-band non-contiguous CA power class 2 for UEs without indicating IE *dualPA-Architecture* supported. The allowed maximum output power reduction is defined as:

$MPR = M_A$  Where  $M_A$  is defined as follows

|         |       |                       |
|---------|-------|-----------------------|
| $M_A =$ | 14;   | $0 \leq B < 1.08$     |
|         | 12;   | $1.08 \leq B < 2.16$  |
|         | 11.5; | $2.16 \leq B < 3.24$  |
|         | 11;   | $3.24 \leq B < 5.04$  |
|         | 9.5;  | $5.04 \leq B < 10.08$ |
|         | 8.5;  | $10.08 \leq B < 36$   |
|         | 6.5;  | $36 \leq B$           |

#### 6.2A.2.3 UE maximum output power reduction for Inter-band CA

For inter-band carrier aggregation with one uplink carrier assigned to one NR band, the requirements in subclause 6.2.2 apply.

For inter-band carrier aggregation with two uplink contiguous carrier assigned to one NR band, the maximum output power reduction requirements for intra-band contiguous carrier aggregation in subclause 6.2A.2.1 apply for that band.

For inter-band carrier aggregation with two uplink non-contiguous carrier assigned to one NR band, the maximum output power reduction requirements for intra-band non-contiguous carrier aggregation in subclause 6.2A.2.2 apply for that band.

For inter-band carrier aggregation with uplink assigned to two NR bands, the requirements in clause 6.2.2 apply for each uplink component carrier.

For combinations of intra-band and inter-band carrier aggregation with three uplink component carriers (up to two contiguously aggregated carriers per operating band), the maximum output power reduction requirements specified in subclause 6.2.2 apply for the NR band supporting one component carrier, and for the NR band supporting two contiguous component carriers the requirements specified in subclause 6.2A.2.1 apply.

## 6.2A.2.4 Void

## 6.2A.3 UE additional maximum output power reduction for CA

### 6.2A.3.1 UE additional maximum output power reduction for Intra-band CA

#### 6.2A.3.1.1 UE additional maximum output power reduction for Intra-band contiguous CA

Additional emission requirements can be signalled by the network. Each additional emission requirement is associated with a unique network signalling (NS) value indicated in RRC signalling by an NR frequency band number of the applicable operating band and an associated value in the field *additionalSpectrumEmission*. Throughout this specification, the notion of indication or signalling of an NS value refers to the corresponding indication of an NR frequency band number of the applicable operating band, the IE field *freqBandIndicatorNR* and an associated value of *additionalSpectrumEmission* in the relevant RRC information elements [7]. Relation between NR CA band and NR frequency band is specified in Table 5.2A.1-1.

To meet the additional requirements, additional maximum power reduction (A-MPR) is allowed for the maximum output power as specified in Table 6.2A.1.1-1. Unless stated otherwise, the total reduction to UE maximum output power is  $\max(\text{MPR}, \text{A-MPR})$  where MPR is defined in clause 6.2A.2.1. In absense of modulation and waveform types the A-MPR applies to all modulation and waveform types.

Table 6.2A.3.1.1-1 specifies the additional requirements with their associated network signalling values and the allowed A-MPR and applicable CA band(s) for each CA\_NS value. The CA\_NS\_xy value indicates the additional unwanted emissions requirements that apply for intra-band contiguous CA bands with NS\_xy indicated or configured in multiple uplink serving cells, except CA\_NS\_01 that indicates the general emission requirements for intra-band contiguous CA bands. The mapping of NR CA band numbers and values of the *additionalSpectrumEmission* to network signalling labels is specified in Table 6.2A.3.1.1-2. For any NR CA band not listed in Table 6.2A.3.1.1-2 the network signalling label CA\_NS\_01 applies.

**Table 6.2A.3.1.1-1: Additional maximum power reduction (A-MPR)**

| Network signalling label | Requirements (clause)        | NR CA Band     | Aggregated channel bandwidth (MHz) | Resources blocks ( $N_{RB}$ )       | A-MPR (dB)   |
|--------------------------|------------------------------|----------------|------------------------------------|-------------------------------------|--------------|
| CA_NS_01                 | 6.5A.2.2.1<br>6.5A.3.2.1     | Table 5.2A.1-1 | All applicable NR CA bands         | All applicable NR CA configurations | N/A          |
| CA_NS_04                 | 6.5A.2.3.1.1<br>6.5A.3.3.1.1 | CA_n41         | Table 5.5A.1-1                     | 6.2A.3.1.1.1                        | 6.2A.3.1.1.1 |
| CA_NS_27                 | 6.5A.2.3.1.2<br>6.5A.3.3.1.2 | CA_n48         | Table 5.5A.1-1                     | 6.2A.3.1.1.2                        | 6.2A.3.1.1.2 |
| CA_NS_46                 | 6.5A.3.3.1.3                 | CA_n7          | Table 5.5A.1-1                     | 6.2A.3.1.1.3                        | 6.2A.3.1.1.3 |
| CA_NS_55,<br>CA_NS_57    | See CA_NS_01                 | CA_n77         | Table 5.5A.1-1                     | 6.2A.2.1                            | See CA_NS_01 |

For UEs configured with intra-band contiguous CA in n77 and if NS\_01 is indicated for an uplink component carrier in the range 3450-3650 MHz and NS\_01 or NS\_57 for another uplink component carrier below 3980 MHz and partly or fully confined within the range 3650-3980 MHz, the allowed additional spurious emission and maximum output power reduction requirements are according to CA\_NS\_01.

**Table 6.2A.3.1.1-2: Mapping of network signaling label**

| NR CA band                                                                                                                               | Value of additionalSpectrumEmission |          |          |   |   |   |   |   |
|------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|----------|----------|---|---|---|---|---|
|                                                                                                                                          | 0                                   | 1        | 2        | 3 | 4 | 5 | 6 | 7 |
| CA_n41                                                                                                                                   | CA_NS_01                            | CA_NS_04 |          |   |   |   |   |   |
| CA_n48                                                                                                                                   | CA_NS_01                            | CA_NS_27 |          |   |   |   |   |   |
| CA_n7                                                                                                                                    | CA_NS_01                            | CA_NS_46 |          |   |   |   |   |   |
| CA_n77                                                                                                                                   | CA_NS_01                            | CA_NS_55 | CA_NS_57 |   |   |   |   |   |
| NOTE: <i>additionalSpectrumEmission</i> corresponds to an information element of the same name defined in clause 6.3.2 of TS 38.331 [7]. |                                     |          |          |   |   |   |   |   |



## 6.2A.3.1.1.1 A-MPR for CA\_NS\_04

## 6.2A.3.1.1.1.1 Contiguous allocations

For all waveform type, modulations and scs when  $F_{\text{edge, low}} - BW_{\text{Channel\_CA}} \geq 2490.5$  MHz, A-MPR = MPR

For all modulations and SCS when  $F_{\text{edge, low}} - BW_{\text{Channel\_CA}} < 2490.5$  MHz

if the RB allocation is an inner allocation as defined in clause 6.2A.2.1, then A-MPR = MPR

Except for  $RB_{\text{start}} \leq 0.33 * BW_{\text{channel\_CA}} / 0.18 \text{ MHz}$ ,  $AMPR = \max(\text{MPR}, AMPR_{\text{cc}})$ .

if the RB allocation is an outer allocation as defined in clause 6.2A.2.1,

then A-MPR = MPR+1.5dB for BW Class B A-MPR = MPR for BW class C.

Where

- MPR is the MPR as defined in Table 6.2A.2.1-1, Table 6.2A.2.1-1a and Table 6.2A.2.1-1b for PC3 and PC2 respectively and the respective CA bandwidth class
- $AMPR_{\text{cc}}$  is defined as the PC3\_A2 or PC2\_A4 AMPR in table 6.2.3.2-2 for PC3 and PC2 respectively.

## 6.2A.3.1.1.1.2 Non-contiguous allocations

For intra-band contiguous CA\_n41B and CA\_n41C and it receives IE CA\_NS\_04, the UE determines the allowed Additional Maximum Power Reduction (AMPR) for the maximum output power as specified in this clause. The AMPR is specified by  $AMPR_{\text{IM3}}$  to meet -25dBm/MHz when IM3 falls in -25dBm/MHz region of Table 6.5A.2.3.1.1-1 or Table 6.5A.3.3.1.1-1. And uses MPR for all other cases.

The UE determines the AMPR type as follows:

For all waveform types, modulations and SCS when  $F_{\text{edge, low}} - BW_{\text{Channel\_CA}} \geq 2490.5$  MHz,

if allocation is an inner or outer 1 allocation as defined in clause 6.2A.2.1 then A-MPR = MPR

if allocation is an outer 2 allocation as defined in clause 6.2A.2.1 then A-MPR = MPR+1dB

For all waveform types, modulations and SCS when  $F_{\text{edge, low}} - BW_{\text{Channel\_CA}} < 2490.5$  MHz

If  $\text{AND}(\text{MIN}(F_{\text{IM3, low\_block, high}}, SEM_{-13, \text{low}}) < F_{\text{filter, low}}, \text{MAX}(SEM_{-13, \text{high}}, F_{\text{IM3, high\_block, low}}) > F_{\text{filter, high}})$

if RB allocation is an inner or outer 1 allocation as defined in clause 6.2A.2.1 then A-MPR = MPR

if RB allocation is an outer 2 allocation as defined in clause 6.2A.2.1 then A-MPR = MPR+1dB

Else

A-MPR =  $AMPR_{\text{IM3}}$  defined in Clause 6.2A.3.1.1.1.3.

where

- MPR is the MPR as defined in Table 6.2A.2.1-2, Table 6.2A.2.1-3 and Table 6.2A.2.1-4 for PC3 and PC2 respectively and the respective CA bandwidth class

- $F_{\text{IM3, low\_block, high}} = (2 * F_{\text{low\_alloc, high\_edge}}) - F_{\text{high\_alloc, low\_edge}}$
- $F_{\text{IM3, high\_block, low}} = (2 * F_{\text{high\_alloc, low\_edge}}) - F_{\text{low\_alloc, high\_edge}}$
- $F_{\text{low\_alloc, low\_edge}}$  is the lowermost frequency of lower transmission bandwidth allocation.
- $F_{\text{low\_alloc, high\_edge}}$  is the uppermost frequency of lower transmission bandwidth allocation.
- $F_{\text{high\_alloc, low\_edge}}$  is the lowermost frequency of upper transmission bandwidth allocation.
- $F_{\text{high\_alloc, high\_edge}}$  is the uppermost frequency of upper transmission bandwidth allocation.

- $F_{\text{filter,low}} = 2480 \text{ MHz}$
- $F_{\text{filter,high}} = 2745 \text{ MHz}$
- $\text{SEM}_{-13,\text{high}} = \text{Threshold frequency where upper spectral emission mask for upper channel drops from -13 dBm / 1MHz to -25 dBm / 1MHz, as specified in Clause 6.5A.2.3.1.1}$
- $\text{SEM}_{-13,\text{low}} = \text{Threshold frequency where lower spectral emission mask below the lower channel drops from -13 dBm / MHz to -25 dBm / MHz, as specified in Clause 6.5A.2.3.1.1}$

#### 6.2A.3.1.1.1.3 $\text{AMPR}_{\text{IM3}}$ to meet -25dBm/MHz

$\text{AMPR}$  in this clause is for intra-band contiguous  $\text{CA}_{\text{n41B}}$  and  $\text{CA}_{\text{n41C}}$ . The allowed maximum output power reduction is defined as:

$\text{AMPR}_{\text{IM3}} = M_A$ , Where  $M_A$  is defined as follows

$$M_A = \begin{cases} 13; & 0 \leq B < 2.16 \\ 11.5; & 2.16 \leq B < 3.24 \\ 10.5; & 3.24 \leq B < 5.04 \\ 9.5; & 5.04 \leq B < 10.08 \\ 8; & 10.08 \leq B < 16.56 \\ 7; & 16.56 \leq B < 21.96 \\ 6; & 21.96 \leq B \end{cases}$$

Where:

$$B = (L_{\text{CRB1}} * 12 * \text{SCS}_1 + L_{\text{CRB2}} * 12 * \text{SCS}_2) / 1,000 \text{ (MHz)}, \text{ where } \text{SCS}_1 \text{ and } \text{SCS}_2 \text{ are expressed in kHz.}$$

and  $L_{\text{CRB1}}$ ,  $\text{SCS}_1$  are for  $\text{CC1}$ ,  $L_{\text{CRB2}}$ ,  $\text{SCS}_2$  are for  $\text{CC2}$ ,  $\text{CC1}$  is the component carrier with lower frequency.

#### 6.2A.3.1.1.2 A-MPR for $\text{CA}_{\text{NS\_27}}$

##### 6.2A.3.1.1.2.1 Contiguous allocations

For all modulations and scs when  $F_{\text{edge, low}} - \text{BW}_{\text{Channel\_CA}} \geq 3540 \text{ MHz}$  AND  $F_{\text{edge, high}} + \text{BW}_{\text{Channel\_CA}} \leq 3710 \text{ MHz}$  if allocation is inner 1 then A-MPR = 0 dB where inner 1 is defined as

$$\text{RB}_{\text{Start,Low}} = \max(1, \text{floor}(L_{\text{CRB}}/2))$$

where  $\max()$  indicates the largest value of all arguments and  $\text{floor}(x)$  is the greatest integer less than or equal to  $x$ .

$$\text{RB}_{\text{Start,High}} = N_{\text{RB\_agg}} - \text{RB}_{\text{Start,Low}} - L_{\text{CRB}}$$

with following conditions

$$\text{RB}_{\text{Start,Low}} \leq \text{RB}_{\text{Start}} \leq \text{RB}_{\text{Start,High}}, \text{ and}$$

$$L_{\text{CRB}} \leq \text{ceil}(N_{\text{RB\_agg}}/2)$$

$\text{AMPR} = 5 \text{ dB}$  for some exeptions for inner 1 region. These exceptions are defined when  $L_{\text{CRB}} < 8$  any of the following conditions are met:

$$\text{RB}_{\text{start}} \leq 30 \text{ or } \text{RB}_{\text{end}} \geq 164 \text{ for } \text{BW}_{\text{Channel\_CA}} = 40\text{MHz or}$$

for the subset of frequencies that satisfy  $3540 \text{ MHz} + \text{BW}_{\text{Channel\_CA}} \leq F_{\text{edge, low}} < 3530 \text{ MHz} + 2 * \text{BW}_{\text{Channel\_CA}}$ , the following exception thresholds apply

for  $BW_{\text{Channel\_CA}} = 35\text{MHz}$  threshold of  $RB_{\text{start}} \leq 25$ , and  
 for  $BW_{\text{Channel\_CA}} = 30\text{MHz}$  threshold of  $RB_{\text{start}} \leq 19$ , and  
 for  $BW_{\text{Channel\_CA}} = 25\text{MHz}$  threshold of  $RB_{\text{start}} \leq 14$ , and  
 for  $BW_{\text{Channel\_CA}} = 20\text{MHz}$  threshold of  $RB_{\text{start}} \leq 9$ , and  
 for  $BW_{\text{Channel\_CA}} = 15\text{MHz}$  threshold of  $RB_{\text{start}} \leq 3$

or for the subset of frequencies that satisfy  $3720\text{ MHz} - 2 \cdot BW_{\text{Channel\_CA}} < F_{\text{edge, high}} \leq 3710\text{ MHz} - BW_{\text{Channel\_CA}}$ , the following exception thresholds apply

for  $BW_{\text{Channel\_CA}} = 35\text{MHz}$  threshold of  $RB_{\text{end}} \geq 144$ , and  
 for  $BW_{\text{Channel\_CA}} = 30\text{MHz}$  threshold of  $RB_{\text{end}} \geq 124$ , and  
 for  $BW_{\text{Channel\_CA}} = 25\text{MHz}$  threshold of  $RB_{\text{end}} \geq 104$ , and  
 for  $BW_{\text{Channel\_CA}} = 20\text{MHz}$  threshold of  $RB_{\text{end}} \geq 80$ , and  
 for  $BW_{\text{Channel\_CA}} = 15\text{MHz}$  threshold of  $RB_{\text{end}} \geq 68$ ,

else for non-inner 1 allocations  $A\text{-MPR} = 5\text{ dB}$  when  $F_{\text{edge, low}} - BW_{\text{Channel\_CA}} \geq 3540\text{ MHz}$  AND  $F_{\text{edge, high}} + BW_{\text{Channel\_CA}} \leq 3710\text{ MHz}$

For all modulations and scs when  $3550\text{ MHz} \leq F_{\text{edge, low}} < 3540\text{ MHz} + BW_{\text{Channel\_CA}}$

if allocation is inner 3 then  $A\text{-MPR} = 0\text{ dB}$ , where inner 3 is defined as

$$N_{\text{RB\_agg}}/4 < RB_{\text{start}} < N_{\text{RB\_agg}}/4 - L_{\text{CRB}} \text{ AND } L_{\text{CRB}} < N_{\text{RB\_agg}}/4$$

Inner 3 region exceptions thresholds are

for  $BW_{\text{Channel\_CA}} = 40\text{MHz}$  threshold of  $RB_{\text{start}} \leq 63$ , and  
 for  $BW_{\text{Channel\_CA}} = 35\text{MHz}$  threshold of  $RB_{\text{start}} \leq 52$ , and  
 for  $BW_{\text{Channel\_CA}} = 30\text{MHz}$  threshold of  $RB_{\text{start}} \leq 42$ , and

For which  $A\text{MPR} = 11.5\text{dB}$

else for non-inner 3 allocations when  $BW_{\text{agg}} \leq 20\text{ MHz}$ ,  $A\text{-MPR} = 7\text{ dB}$  or when  $BW_{\text{agg}} > 20\text{ MHz}$ ,  $A\text{-MPR} = 11.5\text{dB}$  when  $3550\text{ MHz} \leq F_{\text{edge, low}} < 3540\text{ MHz} + BW_{\text{Channel\_CA}}$ .

For all modulations and scs when  $3710\text{ MHz} - BW_{\text{Channel\_CA}} < F_{\text{edge, high}} \leq 3700$

if allocation is inner 3 then  $A\text{-MPR} = 0\text{ dB}$ .

Inner 3 region exceptions thresholds are

for  $BW_{\text{Channel\_CA}} = 40\text{MHz}$  threshold of  $RB_{\text{end}} \geq 132$ , and  
 for  $BW_{\text{Channel\_CA}} = 35\text{MHz}$  threshold of  $RB_{\text{end}} \geq 121$ , and  
 for  $BW_{\text{Channel\_CA}} = 30\text{MHz}$  threshold of  $RB_{\text{end}} \geq 110$ , and

For which  $A\text{MPR} = 11.5\text{dB}$

else for non-inner 3 allocation when  $BW_{\text{agg}} \leq 20\text{ MHz}$ ,  $A\text{-MPR} = 7\text{ dB}$  or when  $BW_{\text{agg}} > 20\text{ MHz}$ ,  $A\text{-MPR} = 11.5\text{dB}$  when  $3710\text{ MHz} - BW_{\text{Channel\_CA}} < F_{\text{edge, high}} \leq 3700$ .

## 6.2A.3.1.1.2.2 Non-contiguous allocations

For all modulations and scs when  $F_{\text{edge, low}} - BW_{\text{Channel\_CA}} \geq 3540 \text{ MHz}$  AND  $F_{\text{edge, high}} + BW_{\text{Channel\_CA}} \leq 3710 \text{ MHz}$

A-MPR=

|       |                        |
|-------|------------------------|
| 13;   | $0 \leq B < 1.08$      |
| 12;   | $1.08 \leq B < 2.16$   |
| 11;   | $2.16 \leq B < 3.24$   |
| 10.5; | $3.24 \leq B < 5.04$   |
| 9.5;  | $5.04 \leq B < 10.08$  |
| 8;    | $10.08 \leq B < 16.56$ |
| 7;    | $16.56 \leq B < 21.96$ |
| 6.5;  | $21.96 \leq B$         |

For all modulations and scs when  $3550 \text{ MHz} \leq F_{\text{edge, low}} < 3540 \text{ MHz} + BW_{\text{Channel\_CA}}$  or  $3710 \text{ MHz} - BW_{\text{Channel\_CA}} < F_{\text{edge, high}} \leq 3700$

when  $BW_{\text{Channel\_CA}} \leq 20 \text{ MHz}$

A-MPR=

|       |                        |
|-------|------------------------|
| 13;   | $0 \leq B < 1.08$      |
| 12;   | $1.08 \leq B < 2.16$   |
| 11;   | $2.16 \leq B < 3.24$   |
| 10.5; | $3.24 \leq B < 5.04$   |
| 9.5;  | $5.04 \leq B < 10.08$  |
| 8;    | $10.08 \leq B < 16.56$ |
| 7;    | $16.56 \leq B < 21.96$ |
| 6.5;  | $21.96 \leq B$         |

or when  $BW_{\text{Channel\_CA}} > 20 \text{ MHz}$

A-MPR =

|       |                        |
|-------|------------------------|
| 20;   | $0 \leq B < 1.08$      |
| 19.5; | $1.08 \leq B < 2.16$   |
| 19;   | $2.16 \leq B < 3.24$   |
| 18.5; | $3.24 \leq B < 5.04$   |
| 18;   | $5.04 \leq B < 10.08$  |
| 17;   | $10.08 \leq B < 16.56$ |
| 16;   | $16.56 \leq B < 21.96$ |
| 13;   | $21.96 \leq B$         |

Where:

$B = (L_{\text{CRB1}} * 12 * \text{SCS}_1 + L_{\text{CRB2}} * 12 * \text{SCS}_2) / 1,000 \text{ (MHz)}$ , where  $\text{SCS}_1$  and  $\text{SCS}_2$  are expressed in kHz.

and  $L_{\text{CRB1}}$ ,  $\text{SCS}_1$  are for CC1,  $L_{\text{CRB2}}$ ,  $\text{SCS}_2$  are for CC2, CC1 is the component carrier with lower frequency.

## 6.2A.3.1.1.3 A-MPR for CA\_NS\_46

## 6.2A.3.1.1.3.1 Contiguous allocations

For all modulations and scs when BWChannel\_CA > 25 MHz

IF  $\text{RBend} > \text{NRB\_agg} \cdot 5/6$  for all BW's except for BWChannel\_CA=50MHz where the threshold is  $\text{RBend} > \text{NRB\_agg} \cdot 3/4$  OR for all BW's  $\text{RBend} > 4/3 \cdot \text{NRB\_agg} - \text{LCRB}$

THEN A-MPR = 11dB

ELSE IF  $\text{RBend} < \text{NRB\_agg} / 6$  AND  $\text{LCRB} < 5$

THEN A-MPR = 5dB

ELSE IF  $\text{LCRB} \cdot 3/2 < \text{RBend} < \text{NRB\_agg} \cdot 3/4$  AND  $\text{LCRB} < \text{NRB\_agg} / 4$

THEN A-MPR = 0 dB,

OTHERWISE A-MPR = 7 dB.

For all modulations and scs when BWChannel\_CA ≤ 25 MHz and  $2595 \text{ MHz} - 2 \cdot \text{BWChannel\_CA} < \text{Fedge\_high} \leq 2570 \text{ MHz}$

IF  $\text{RBend} \geq 4/3 \cdot \text{NRB\_agg} - \text{LCRB}$

THEN A-MPR = 6 dB.

OTHERWISE A-MPR = 0 dB.

For all modulations and scs when BWChannel\_CA ≤ 25 MHz and  $\text{Fedge\_high} \leq 2595 \text{ MHz} - 2 \cdot \text{BWChannel\_CA}$ ,  
A-MPR = 0 dB.

## 6.2A.3.1.1.3.2 Non-contiguous allocations

[For all modulations and scs when BWChannel\_CA > 25 MHz and  $2595 \text{ MHz} - \text{BWChannel\_CA} \leq \text{Fedge\_high} \leq 2570 \text{ MHz}$

$A\text{-MPR}_{\text{CA\_IM3}} =$

|       |                        |
|-------|------------------------|
| 20;   | $0 \leq B < 1.08$      |
| 19.5; | $1.08 \leq B < 2.16$   |
| 19;   | $2.16 \leq B < 3.24$   |
| 18.5; | $3.24 \leq B < 5.04$   |
| 18;   | $5.04 \leq B < 10.08$  |
| 17;   | $10.08 \leq B < 16.56$ |
| 16;   | $16.56 \leq B < 21.96$ |
| 13;   | $21.96 \leq B$         |

For all modulations and scs when BWChannel\_CA > 25 MHz and  $\text{Fedge\_high} < 2595 \text{ MHz} - \text{BWChannel\_CA}$

$A\text{-MPR}_{\text{CA\_IM5}} =$

|       |                       |
|-------|-----------------------|
| 13;   | $0 \leq B < 1.08$     |
| 12;   | $1.08 \leq B < 2.16$  |
| 11;   | $2.16 \leq B < 3.24$  |
| 10.5; | $3.24 \leq B < 5.04$  |
| 9.5;  | $5.04 \leq B < 10.08$ |

- 8;  $10.08 \leq B < 16.56$   
 7.5;  $16.56 \leq B < 21.96$   
 7;  $21.96 \leq B$

For all modulations and scs when  $BWChannel\_CA \leq 25$  MHz and  $2595 \text{ MHz} - 2 * BWChannel\_CA \leq Fedge\_high \leq 2570$  MHz

$A-MPR_{CA\_IM5} =$

- 13;  $0 \leq B < 1.08$   
 12;  $1.08 \leq B < 2.16$   
 11;  $2.16 \leq B < 3.24$   
 10.5;  $3.24 \leq B < 5.04$   
 9.5;  $5.04 \leq B < 10.08$   
 8;  $10.08 \leq B < 16.56$   
 7.5;  $16.56 \leq B < 21.96$   
 7;  $21.96 \leq B$

Where:

$B = (L_{CRB1} * 12 * SCS_1 + L_{CRB2} * 12 * SCS_2) / 1,000$  (MHz), where  $SCS_1$  and  $SCS_2$  are expressed in kHz.

and  $L_{CRB1}$ ,  $SCS_1$  are for CC1,  $L_{CRB2}$ ,  $SCS_2$  are for CC2, CC1 is the component carrier with lower frequency.]

### 6.2A.3.1.2 UE additional maximum output power reduction for Intra-band non-contiguous CA

#### 6.2A.3.1.2.0 General

Table 6.2A.3.1.2-1 specifies the additional requirements with their associated network signalling values and the allowed A-MPR and applicable CA band(s) for each  $CA\_NC\_NS\_xy$  value. The  $CA\_NC\_NS\_xy$  value indicates the additional unwanted emissions requirements that apply for intra-band non-contiguous CA bands with  $NS\_xy$  indicated or configured in multiple uplink serving cells, except  $CA\_NC\_NS\_01$  that indicates the general emission requirements for intra-band non-contiguous CA bands. The mapping of NR CA band numbers and values of the *additionalSpectrumEmission* to network signalling labels is specified in Table 6.2A.3.1.2-2. For any NR CA band not listed in Table 6.2A.3.1.2-2 the network signalling label  $CA\_NC\_NS\_01$  applies.

**Table 6.2A.3.1.2-1: Additional Maximum Power Reduction (A-MPR) for intra-band non-contiguous CA**

| CA Network Signalling value            | Requirements (clause)        | Uplink CA Configuration             | A-MPR for sub-blocks in order of increasing uplink carrier frequency |
|----------------------------------------|------------------------------|-------------------------------------|----------------------------------------------------------------------|
|                                        |                              |                                     | A-MPR [dB] (clause)                                                  |
| $CA\_NC\_NS\_01$                       | 6.5A.2.2.2<br>6.5A.3.2.2     | All applicable NR CA configurations | N/A                                                                  |
| $CA\_NC\_NS\_04$                       | 6.5A.2.3.2.1<br>6.5A.3.3.2.1 | $CA\_n41(2A)$                       | 6.2A.3.1.2.1                                                         |
| $CA\_NC\_NS\_55$ ,<br>$CA\_NC\_NS\_57$ | See<br>$CA\_NC\_NS\_01$      | $CA\_n77(2A)$                       | See<br>$CA\_NC\_NS\_01$                                              |

For UEs configured with intra-band non-contiguous CA in  $n77$  and if  $NS\_01$  is indicated for an uplink component carrier in the range 3700-3980 MHz and  $NS\_01$  or  $NS\_55$  for another uplink component carrier in the range 3450-3550 MHz, or if  $NS\_01$  is indicated for an uplink component carrier in the range 3450-3650 MHz and  $NS\_01$  or  $NS\_57$  for another uplink component carrier below 3980 MHz and partly or fully confined within the range 3650-3980 MHz, the allowed additional spurious emission and maximum output power reduction requirements are according to  $CA\_NC\_NS\_01$ .

Table 6.2A.3.1.2-2: Mapping of network signaling label

| NR CA band                                                                                                                               | Value of additionalSpectrumEmission |             |             |   |   |   |   |   |
|------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|-------------|-------------|---|---|---|---|---|
|                                                                                                                                          | 0                                   | 1           | 2           | 3 | 4 | 5 | 6 | 7 |
| CA_n41                                                                                                                                   | CA_NC_NS_01                         | CA_NC_NS_04 |             |   |   |   |   |   |
| CA_n77                                                                                                                                   | CA_NC_NS_01                         | CA_NC_NS_55 | CA_NC_NS_57 |   |   |   |   |   |
| NOTE: <i>additionalSpectrumEmission</i> corresponds to an information element of the same name defined in clause 6.3.2 of TS 38.331 [7]. |                                     |             |             |   |   |   |   |   |

## 6.2A.3.1.2.1 AMPR for CA\_NC\_NS\_04 (CA\_n41(2A))

For intra-band non-contiguous CA\_n41(2A) and it receives IE CA\_NC\_NS\_04 for UE indicating *dualPA-Architecture* supported for PC3 and PC2 operation, the UE determines the allowed Additional Maximum Power Reduction (AMPR) for the maximum output power as specified in this clause. The AMPR is specified into 2 types: AMPR to meet -25dBm/MHz and -13dBm/MHz. The A-MPR defined in this clause is used instead of MPR defined in 6.2A.2.2, not additively, so CA MPR=0 when CA\_NC\_NS\_04 is signaled.

The UE determines the AMPR type as follows:

If  $\text{AND}(\text{MIN}(F_{\text{IM3,low\_block,high}}, \text{SEM}_{-13,\text{low}}) < F_{\text{filter,low}}, \text{MAX}(\text{SEM}_{-13,\text{high}}, F_{\text{IM3,high\_block,low}}) > F_{\text{filter,high}})$

- A-MPR<sub>IM3</sub> defined in Clause 6.2A.3.1.2.1.2 for PC3 and 6.2A.3.1.2.1.4 for PC2

Else

- A-MPR<sub>IM3</sub> defined in Clause 6.2A.3.1.2.1.1 for PC3 and 6.2A.3.1.2.1.3 for PC2

where

- L<sub>CRB1</sub> is for CC1 which is the component carrier with lower frequency
- L<sub>CRB2</sub> is for CC2 which is the component carrier with higher frequency
- $B = (L_{\text{CRB1}} * 12 * \text{SCS}_1 + L_{\text{CRB2}} * 12 * \text{SCS}_2) / 1,000$  (MHz), where SCS<sub>1</sub> and SCS<sub>2</sub> are expressed in kHz.
- $F_{\text{IM3,low\_block,high}} = (2 * F_{\text{low\_alloc,high\_edge}}) - F_{\text{high\_alloc,low\_edge}}$
- $F_{\text{IM3,high\_block,low}} = (2 * F_{\text{high\_alloc,low\_edge}}) - F_{\text{low\_alloc,high\_edge}}$
- F<sub>low\_alloc,low\_edge</sub> is the lowermost frequency of lower transmission bandwidth allocation.
- F<sub>low\_alloc,high\_edge</sub> is the uppermost frequency of lower transmission bandwidth allocation.
- F<sub>high\_alloc,low\_edge</sub> is the lowermost frequency of upper transmission bandwidth allocation.
- F<sub>high\_alloc,high\_edge</sub> is the uppermost frequency of upper transmission bandwidth allocation.
- F<sub>filter,low</sub> = 2480 MHz
- F<sub>filter,high</sub> = 2745 MHz
- SEM<sub>-13,high</sub> = Threshold frequency where upper spectral emission mask for upper channel drops from -13 dBm / 1MHz to -25 dBm / 1MHz, as specified in Clause 6.5A.2.3.2.
- SEM<sub>-13,low</sub> = Threshold frequency where lower spectral emission mask below the lower channel drops from -13 dBm / MHz to -25 dBm / MHz, as specified in Clause 6.5A.2.3.2.

6.2A.3.1.2.1.1 AMPR<sub>IM3</sub> to meet -25dBm/MHz for PC3

AMPR in this clause is for intra-band non-contiguous CA\_n41(2A) power class 3 for UEs indicating IE *dualPA-Architecture* supported. The allowed maximum output power reduction is defined as:

AMPR<sub>IM3</sub>=M<sub>A</sub> Where M<sub>A</sub> is defined as follows

$$\begin{aligned}
M_A = & 12; & 0 \leq B < 1.08 \\
& 12; & 1.08 \leq B < 2.16 \\
& 11; & 2.16 \leq B < 3.24 \\
& 10; & 3.24 \leq B < 5.04 \\
& 9; & 5.04 \leq B < 10.08 \\
& 8; & 10.08 \leq B < 16.38 \\
& 7; & 16.38 \leq B < 21.78 \\
& 6; & 21.78 \leq B
\end{aligned}$$

#### 6.2A.3.1.2.1.2 AMPR<sub>IM3</sub> to meet -13dBm/MHz for PC3

AMPR in this clause is for intra-band non-contiguous CA\_n41(2A) power class 3 for UEs indicating IE *dualPA-Architecture* supported. The allowed maximum output power reduction is defined as:

$$\text{AMPR}_{\text{IM3}} = M_A$$

Where  $M_A$  is defined as follows

$$\begin{aligned}
M_A = & 9 ; & 0 \leq B < 0.54 \\
& 8 ; & 0.54 \leq B < 1.08 \\
& 7 ; & 1.08 \leq B < 2.16 \\
& 6.5 ; & 2.16 \leq B < 3.24 \\
& 5.5 ; & 3.24 \leq B < 5.4 \\
& 4 ; & 5.4 \leq B
\end{aligned}$$

#### 6.2A.3.1.2.1.3 AMPR<sub>IM3</sub> to meet -25dBm/MHz for PC2

AMPR in this clause is for intra-band non-contiguous CA\_n41(2A) power class 2 for UEs indicating IE *dualPA-Architecture* supported. The allowed maximum output power reduction is defined as:

AMPR<sub>IM3</sub>= $M_A$  Where  $M_A$  is defined as follows

$$\begin{aligned}
M_A = & 14.5; & 0 \leq B < 1.44 \\
& 14.0; & 1.44 \leq B < 2.88 \\
& 13.0; & 2.88 \leq B < 5.76 \\
& 11.0; & 5.76 \leq B < 10.8 \\
& 9.5; & 10.8 \leq B < 23.04 \\
& 9.0; & 23.04 \leq B
\end{aligned}$$

Where:

$$B = (L_{\text{CRB\_alloc},1} * 12 * \text{SCS}_1 + L_{\text{CRB\_alloc},2} * 12 * \text{SCS}_2) / 1,000 \text{ (MHz)}, \text{ where } \text{SCS}_1 \text{ and } \text{SCS}_2 \text{ are expressed in kHz.}$$



#### 6.2A.3.1.2.1.4 $AMPR_{IM3}$ to meet -13dBm/MHz for PC2

$AMPR$  in this clause is for intra-band non-contiguous CA\_n41(2A) power class 2 for UEs indicating IE *dualPA-Architecture* supported. The allowed maximum output power reduction is defined as:

$$AMPR_{IM3} = M_A$$

Where  $M_A$  is defined as follows

$$M_A = \begin{array}{ll} 9 & ; \quad 0 \leq B < 0.54 \\ 8 & ; \quad 0.54 \leq B < 1.08 \\ 7 & ; \quad 1.08 \leq B < 2.16 \\ 6.5 & ; \quad 2.16 \leq B < 3.24 \\ 6 & ; \quad 3.24 \leq B < 5.4 \\ 5.5 & ; \quad 5.4 \leq B \leq 10.8 \\ 4 & ; \quad 10.8 < B \end{array}$$

Where:

$$B = (L_{CRB\_alloc,1} * 12 * SCS_1 + L_{CRB\_alloc,2} * 12 * SCS_2) / 1,000 \text{ (MHz)}, \text{ where } SCS_1 \text{ and } SCS_2 \text{ are expressed in kHz.}$$

#### 6.2A.3.1.3 UE additional maximum output power reduction for Inter-band CA

Unless otherwise stated, for inter-band carrier aggregation with one uplink carrier assigned to one NR band, the requirements in subclause 6.2.3 apply.

Unless otherwise stated, for inter-band carrier aggregation with two uplink contiguous carrier assigned to one NR band, the additional maximum output power reduction requirements for intra-band contiguous carrier aggregation in subclause 6.2A.3.1.1 apply for that band, for inter-band carrier aggregation with two uplink non-contiguous carrier assigned to one NR band, the additional maximum output power reduction requirements for intra-band contiguous carrier aggregation in subclause 6.2A.3.1.2 apply for that band.

For combinations of intra-band and inter-band carrier aggregation with three uplink component carriers (up to two contiguously aggregated carriers per operating band), the additional maximum output power reduction requirements specified in subclause 6.2.3 apply for the NR band supporting one component carrier, and for the NR band supporting two contiguous component carriers the requirements specified in subclause 6.2A.3.1.1 apply.

Unless specified in Table 6.2A.3.1.3-1, for inter-band carrier aggregation with uplink assigned to two NR bands, the requirements in clause 6.2.3 apply only to the indicated carrier. The requirements in Table 6.2A.3.1.3-1 are specified in terms of an additional spectrum emission requirement with their associated network signalling values and the allowed A-MPR. Unless otherwise stated, the combined requirements and allowed A-MPR are applicable on both bands when both component carriers are active. Additional spurious emission requirements are signalled by the network to indicate that the UE shall meet the additional requirement for a specific deployment scenario as part of the cell handover/broadcast message.

To meet the additional requirements, additional maximum power reduction (A-MPR) is allowed for the maximum output power as specified in Table 6.2.1-1. Unless stated otherwise, the total reduction to UE maximum output power is  $\max(MPR + \Delta MPR, A-MPR)$  where  $MPR$  and  $\Delta MPR$  are defined in clause 6.2.2. In case of a power class 3 UE, when IE *powerBoostPi2BPSK* is set to 1, power class 2 A-MPR values apply.

For almost contiguous allocations in CP-OFDM waveforms in power class 1.5, 2 and 3, the allowed A-MPR defined in clause 6.2.3 is increased by  $\text{CEIL}\{10 \log_{10}(1 + NRB\_gap / NRB\_alloc), 0.5\}$  dB, where  $NRB\_gap$  is the total number of unallocated RBs between allocated RBs and  $NRB\_alloc$  is the total number of allocated RBs, and the parameter  $LCRB$  is replaced by  $NRB\_alloc + NRB\_gap$  in specifying the RB allocation regions.

Unless otherwise specified, pi/2 BPSK in following A-MPR tables refers to both variants of pi/2 BPSK referenced in 6.2.2 tables 6.2.2-1.

The emission requirements specified in Table 6.2A.3.1.3-1 also apply for the frequency ranges that are less than  $F_{\text{OoB}}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

**Table 6.2A.3.1.3-1: Additional Requirements for uplink inter-band carrier aggregation (two-bands)**

| NR CA combination | Band | Applied NS | Requirements (clause) | A-MPR (table/clause) | Note |
|-------------------|------|------------|-----------------------|----------------------|------|
| CA_n1-n3          | n1   | 05         | 6.5.3.3.4             | Clause 6.2.3.4       | 1    |
|                   |      | 05U        | 6.5.3.3.4, 6.5.2.4.2  | Clause 6.2.3.4       |      |
|                   | n3   | 100        | 6.5.2.4.2             | Table 6.2.3.1-2      |      |
| CA_n1-n8          | n1   | 05         | 6.5.3.3.4             | Clause 6.2.3.4       | 1    |
|                   |      | 05U        | 6.5.3.3.4, 6.5.2.4.2  | Clause 6.2.3.4       |      |
|                   | n8   | 43         | 6.5.3.3.5             | Clause 6.2.3.6       |      |
|                   |      | 43U        | 6.5.3.3.5, 6.5.2.4.2  | Clause 6.2.3.6       |      |
| CA_n1-n18         | n1   | 05         | 6.5.3.3.4             | Clause 6.2.3.4       | 1    |
|                   |      | 05U        | 6.5.3.3.4, 6.5.2.4.2  | Clause 6.2.3.4       |      |
|                   | n18  | 100        | 6.5.2.4.2             | Table 6.2.3.1-2      |      |
| CA_n1-n28         | n1   | 05         | 6.5.3.3.4             | Clause 6.2.3.4       | 1,2  |
|                   |      | 05U        | 6.5.3.3.4, 6.5.2.4.2  | Clause 6.2.3.4       |      |
|                   | n28  | 17         | 6.5.3.3.2             | N/A                  |      |
| CA_n1-n40         | n1   | 05         | 6.5.3.3.4             | Clause 6.2.3.4       | 1    |
|                   |      | 05U        | 6.5.3.3.4, 6.5.2.4.2  | Clause 6.2.3.4       |      |
| CA_n1-n41         | n1   | 05         | 6.5.3.3.4             | Clause 6.2.3.4       | 1    |
|                   |      | 05U        | 6.5.3.3.4, 6.5.2.4.2  | Clause 6.2.3.4       |      |
|                   | n41  | 47         | 6.5.3.3.15            | Table 6.2.3.18-2     |      |
| CA_n1-n74         | n1   | 05         | 6.5.3.3.4             | Clause 6.2.3.4       | 1    |
|                   |      | 05U        | 6.5.3.3.4, 6.5.2.4.2  | Clause 6.2.3.4       |      |
|                   | n74  | 37         | 6.5.3.3.6             | Table 6.2.3.8-1      |      |
| CA_n1-n77         | n1   | 05         | 6.5.3.3.4             | Clause 6.2.3.4       | 1    |
|                   |      | 05U        | 6.5.3.3.4, 6.5.2.4.2  | Clause 6.2.3.4       |      |
| CA_n1-n78         | n1   | 05         | 6.5.3.3.4             | Clause 6.2.3.4       | 1    |
|                   |      | 05U        | 6.5.3.3.4, 6.5.2.4.2  | Clause 6.2.3.4       |      |
| CA_n1-n79         | n1   | 05         | 6.5.3.3.4             | Clause 6.2.3.4       | 1    |
|                   |      | 05U        | 6.5.3.3.4, 6.5.2.4.2  | Clause 6.2.3.4       |      |
| CA_n3-n8          | n3   | 100        | 6.5.2.4.2             | Table 6.2.3.1-2      | 1    |
|                   |      | 43         | 6.5.3.3.5             | Clause 6.2.3.6       |      |
|                   | n8   | 43U        | 6.5.3.3.5, 6.5.2.4.2  | Clause 6.2.3.6       |      |
| CA_n3-n18         | n3   | 100        | 6.5.2.4.2             | Table 6.2.3.1-2      | 1    |
|                   | n18  | 100        | 6.5.2.4.2             | Table 6.2.3.1-2      |      |
| CA_n3-n28         | n3   | 100        | 6.5.2.4.2             | Table 6.2.3.1-2      | 1,2  |
|                   | n28  | 17         | 6.5.3.3.2             | N/A                  |      |
| CA_n3-n40         | n3   | 100        | 6.5.2.4.2             | Table 6.2.3.1-2      | 1    |
| CA_n3-n41         | n3   | 100        | 6.5.2.4.2             | Table 6.2.3.1-2      | 1    |
|                   | n41  | 47         | 6.5.3.3.15            | Table 6.2.3.18-2     |      |
| CA_n3-n74         | n3   | 100        | 6.5.2.4.2             | Table 6.2.3.1-2      | 1    |
|                   | n74  | 37         | 6.5.3.3.6             | Table 6.2.3.8-1      |      |
| CA_n3-n77         | n3   | 100        | 6.5.2.4.2             | Table 6.2.3.1-2      | 1    |
| CA_n3-n78         | n3   | 100        | 6.5.2.4.2             | Table 6.2.3.1-2      | 1    |
| CA_n3-n79         | n3   | 100        | 6.5.2.4.2             | Table 6.2.3.1-2      | 1    |
| CA_n5-n77         | n5   | 100        | 6.5.2.4.2             | Table 6.2.3.1-2      | 1    |
| CA_n5-n78         | n5   | 100        | 6.5.2.4.2             | Table 6.2.3.1-2      | 1    |
| CA_n5-n79         | n5   | 100        | 6.5.2.4.2             | Table 6.2.3.1-2      | 1    |
| CA_n8-n40         | n8   | 43         | 6.5.3.3.5             | Clause 6.2.3.6       | 1    |
|                   |      | 43U        | 6.5.3.3.5, 6.5.2.4.2  | Clause 6.2.3.6       |      |
| CA_n8-n41         | n8   | 43         | 6.5.3.3.5             | Clause 6.2.3.6       | 1    |
|                   |      | 43U        | 6.5.3.3.5, 6.5.2.4.2  | Clause 6.2.3.6       |      |
|                   | n41  | 47         | 6.5.3.3.15            | Table 6.2.3.18-2     |      |
| CA_n8-n78         | n8   | 43         | 6.5.3.3.5             | Clause 6.2.3.6       | 1    |
|                   |      | 43U        | 6.5.3.3.5, 6.5.2.4.2  | Clause 6.2.3.6       |      |
| CA_n8-n79         | n8   | 43         | 6.5.3.3.5             | Clause 6.2.3.6       | 1    |
|                   |      | 43U        | 6.5.3.3.5, 6.5.2.4.2  | Clause 6.2.3.6       |      |
| CA_n18-n28        | n18  | 100        | 6.5.2.4.2             | Table 6.2.3.1-2      | 1, 2 |
|                   | n28  | 17         | 6.5.3.3.2             | N/A                  |      |

|                                                                                                                                                                                          |     |     |            |                  |   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|------------|------------------|---|
| CA_n18-n41                                                                                                                                                                               | n18 | 100 | 6.5.2.4.2  | Table 6.2.3.1-2  | 1 |
| CA_n18-n74                                                                                                                                                                               | n18 | 100 | 6.5.2.4.2  | Table 6.2.3.1-2  | 1 |
|                                                                                                                                                                                          | n74 | 37  | 6.5.3.3.6  | Table 6.2.3.8-1  |   |
| CA_n18-n77                                                                                                                                                                               | n18 | 100 | 6.5.2.4.2  | Table 6.2.3.1-2  | 1 |
| CA_n18-n78                                                                                                                                                                               | n18 | 100 | 6.5.2.4.2  | Table 6.2.3.1-2  | 1 |
| CA_n28-n40                                                                                                                                                                               | n28 | 17  | 6.5.3.3.2  | N/A              | 2 |
| CA_n28-n41                                                                                                                                                                               | n28 | 17  | 6.5.3.3.2  | N/A              | 2 |
|                                                                                                                                                                                          | n41 | 47  | 6.5.3.3.15 | Table 6.2.3.18-2 |   |
| CA_n28-n74                                                                                                                                                                               | n28 | 17  | 6.5.3.3.2  | N/A              | 2 |
|                                                                                                                                                                                          | n74 | 37  | 6.5.3.3.6  | Table 6.2.3.8-1  | 2 |
| CA_n28-n77                                                                                                                                                                               | n28 | 17  | 6.5.3.3.2  | N/A              | 2 |
| CA_n28-n78                                                                                                                                                                               | n28 | 17  | 6.5.3.3.2  | N/A              | 2 |
| CA_n28-n79                                                                                                                                                                               | n28 | 17  | 6.5.3.3.2  | N/A              | 2 |
| CA_n40-n41                                                                                                                                                                               | n41 | 47  | 6.5.3.3.15 | Table 6.2.3.18-2 |   |
| CA_n41-n74                                                                                                                                                                               | n41 | 47  | 6.5.3.3.15 | Table 6.2.3.18-2 |   |
|                                                                                                                                                                                          | n74 | 37  | 6.5.3.3.6  | Table 6.2.3.8-1  |   |
| CA_n41-n77                                                                                                                                                                               | n41 | 47  | 6.5.3.3.15 | Table 6.2.3.18-2 |   |
| CA_n41-n78                                                                                                                                                                               | n41 | 47  | 6.5.3.3.15 | Table 6.2.3.18-2 |   |
| CA_n41-n79                                                                                                                                                                               | n41 | 47  | 6.5.3.3.15 | Table 6.2.3.18-2 |   |
| CA_n74-n77                                                                                                                                                                               | n74 | 37  | 6.5.3.3.6  | Table 6.2.3.8-1  |   |
| CA_n74-n78                                                                                                                                                                               | n74 | 37  | 6.5.3.3.6  | Table 6.2.3.8-1  |   |
| NOTE 1: NS_05U, NS_43U and NS_100 can be signalled for NR bands that have UTRA services deployed and the requirements in clause 6.5.2.4.2 are only applicable to the signalling carrier. |     |     |            |                  |   |
| NOTE 2: Applicable when the assigned NR carrier is confined within 718 MHz and 748 MHz and when the channel bandwidth used is 5 or 10 MHz.                                               |     |     |            |                  |   |

## 6.2A.4 Configured output power for CA

### 6.2A.4.1 Configured transmitted power level

#### 6.2A.4.1.1 Configured transmitted power for Intra-band contiguous CA

For uplink carrier aggregation the UE is allowed to set its configured maximum output power  $P_{\text{CMAX},c}$  for serving cell  $c$  and its total configured maximum output power  $P_{\text{CMAX}}$ .

The configured maximum output power  $P_{\text{CMAX},c}$  on serving cell  $c$  shall be set as specified in clause 6.2.4, but with  $\text{MPR}_c = \text{MPR}$  and  $\text{A-MPR}_c = \text{A-MPR}$  with MPR and A-MPR as determined by subclause 6.2A.2 and 6.2A.3, respectively. For PH reporting the following exception applies: if the UE is configured with multiple uplink serving cells, the power  $P_{\text{CMAX},c}$  used for the purpose of PH reporting on first serving cell  $c = c_1$  does not consider for computation of the PH report transmissions on a second serving cell  $c_2$  as exempted in subclause 7.7.1 in [8]. There is one power management term for the UE, denoted P-MPR, and  $\text{P-MPR}_c = \text{P-MPR}$ .

The total configured maximum output power  $P_{\text{CMAX}}$  shall be set within the following bounds:

$$P_{\text{CMAX},L} \leq P_{\text{CMAX}} \leq P_{\text{CMAX},H}$$

For uplink intra-band contiguous carrier aggregation when same slot pattern is used in all aggregated serving cells,

$$P_{\text{CMAX},L} = \text{MIN}\{10 \log_{10} \sum p_{\text{EMAX},c} - \Delta T_C, P_{\text{EMAX},CA}, (P_{\text{PowerClass},CA} - \Delta P_{\text{PowerClass},CA}) - \text{MAX}(\text{MAX}(\text{MPR}, \text{A-MPR}) + \Delta T_{\text{IB},c} + \Delta T_C + \Delta T_{\text{RxsRS}}, \text{P-MPR}_c) \}$$

$$P_{\text{CMAX},H} = \text{MIN}\{10 \log_{10} \sum p_{\text{EMAX},c}, P_{\text{EMAX},CA}, P_{\text{PowerClass},CA} - \Delta P_{\text{PowerClass},CA} \}$$

where

- $p_{\text{EMAX},c}$  is the linear value of  $P_{\text{EMAX},c}$  which is given by IE *P-Max* for serving cell  $c$  in [7];
- $P_{\text{PowerClass},CA}$  is the maximum UE power specified in Table 6.2A.1.1-1 without taking into account the tolerance;
- MPR and A-MPR are specified in clause 6.2A.2 and 6.2A.3, respectively;

- $\Delta P_{\text{PowerClass,CA}} = 3 \text{ dB}$  for a power class 2 UE when the requirements of default power class are applied as specified in sub-clause 6.2.A.1.1; otherwise  $\Delta P_{\text{PowerClass,CA}} = 0 \text{ dB}$ ;
- $\Delta T_{\text{IB,c}}$  is the additional tolerance for serving cell  $c$  as specified in clause 6.2A.4.2 for NR CA, clause 6.2C.2 for SUL, or TS 38.101-3 clause 6.2B.4.2 for EN-DC; In case the UE supports more than one of band combinations for CA, SUL or DC, and an operating band belongs to more than one band combinations then
  - a) When the operating band frequency range is  $\leq 1 \text{ GHz}$ , the applicable additional  $\Delta T_{\text{IB,c}}$  shall be the average value for all band combinations defined in clause 6.2A.4.2, 6.2C.2 in this specification and 6.2B.4.2 in TS 38.101-3 [3], truncated to one decimal place that apply for that operating band among the supported band combinations. In case there is a harmonic relation between low band UL and high band DL, then the maximum  $\Delta T_{\text{IB,c}}$  among the different supported band combinations involving such band shall be applied
  - b) When the operating band frequency range is  $> 1 \text{ GHz}$ , the applicable additional  $\Delta T_{\text{IB,c}}$  shall be the maximum value for all band combinations defined in clause 6.2A.4.2, 6.2C.2 in this specification and 6.2B.4.2 in TS 38.101-3 [3] for the applicable operating bands.
- $P_{\text{MPR}}$  is the power management term for the UE;
- $\Delta T_{\text{C}}$  is the highest value  $\Delta T_{\text{C,c}}$  among all serving cells  $c$ ;
- $\Delta T_{\text{RxSRS}}$  is the highest value among all serving cells  $c$ ;
- $P_{\text{EMAX,CA}}$  is the value indicated by  $p\text{-NR-FR1}$  or by  $p\text{-UE-FR1}$  whichever is the smallest if both are present.

For uplink intra-band contiguous carrier aggregation, when at least one different numerology/slot pattern is used in aggregated cells, the UE is allowed to set its configured maximum output power  $P_{\text{CMAX,c(i),i}}$  for serving cell  $c(i)$  of slot numerology type  $i$ , and its total configured maximum output power  $P_{\text{CMAX}}$ .

The configured maximum output power  $P_{\text{CMAX,c(i),i}}(p)$  in slot  $p$  of serving cell  $c(i)$  on slot numerology type  $i$  shall be set within the following bounds:

$$P_{\text{CMAX\_L,f,c(i),i}}(p) \leq P_{\text{CMAX,f,c(i),i}}(p) \leq P_{\text{CMAX\_H,f,c(i),i}}(p)$$

where  $P_{\text{CMAX\_L,f,c(i),i}}(p)$  and  $P_{\text{CMAX\_H,f,c(i),i}}(p)$  are the limits for a serving cell  $c(i)$  of slot numerology type  $i$  as specified in clause 6.2.4.

The total UE configured maximum output power  $P_{\text{CMAX}}(p,q)$  in a slot  $p$  of slot numerology or symbol pattern  $i$ , and a slot  $q$  of slot numerology or symbol pattern  $j$  that overlap in time shall be set within the following bounds unless stated otherwise:

$$P_{\text{CMAX\_L}}(p,q) \leq P_{\text{CMAX}}(p,q) \leq P_{\text{CMAX\_H}}(p,q)$$

When slots  $p$  and  $q$  have different transmissions lengths and belong to different cells on different or same bands:

$$P_{\text{CMAX\_L}}(p,q) = \text{MIN} \{ 10 \log_{10} [P_{\text{CMAX\_L,f,c(i),i}}(p) + P_{\text{CMAX\_L,f,c(i),j}}(q)], P_{\text{PowerClass,CA}}, P_{\text{EMAX,CA}} \}$$

$$P_{\text{CMAX\_H}}(p,q) = \text{MIN} \{ 10 \log_{10} [P_{\text{CMAX\_H,f,c(i),i}}(p) + P_{\text{CMAX\_H,f,c(i),j}}(q)], P_{\text{PowerClass,CA}}, P_{\text{EMAX,CA}} \}$$

where  $P_{\text{CMAX\_L,f,c(i),i}}$  and  $P_{\text{CMAX\_H,f,c(i),i}}$  are the respective limits  $P_{\text{CMAX\_L,f,c(i),i}}$  and  $P_{\text{CMAX\_H,f,c(i),i}}$  expressed in linear scale.

$T_{\text{REF}}$  and  $T_{\text{eval}}$  are specified in Table 6.2A.4.1.1-0 when same and different slot patterns are used in aggregated carriers. For each  $T_{\text{REF}}$ , the  $P_{\text{CMAX\_L}}$  is evaluated per  $T_{\text{eval}}$  and given by the minimum value taken over the transmission(s) within the  $T_{\text{eval}}$ ; the minimum  $P_{\text{CMAX\_L}}$  over the one or more  $T_{\text{eval}}$  is then applied for the entire  $T_{\text{REF}}$ . The lesser of  $P_{\text{PowerClass,CA}}$  and  $P_{\text{EMAX,CA}}$  shall not be exceeded by the UE during any period of time.

**Table 6.2A.4.1.1-0:  $P_{\text{CMAX}}$  evaluation window for different slot and channel durations**

| $T_{\text{REF}}$                                           | $T_{\text{eval}}$       | $T_{\text{eval}}$ with frequency hopping                 |
|------------------------------------------------------------|-------------------------|----------------------------------------------------------|
| $T_{\text{REF}}$ of largest slot duration over both UL CCs | Physical channel length | Min( $T_{\text{no\_hopping}}$ , Physical Channel Length) |

If the UE is configured with multiple TAGs and transmissions of the UE on slot  $i$  for any serving cell in one TAG overlap some portion of the first symbol of the transmission on slot  $i + 1$  for a different serving cell in another TAG, the UE minimum of  $P_{\text{CMAX\_L}}$  for slots  $i$  and  $i + 1$  applies for any overlapping portion of slots  $i$  and  $i + 1$ . The lesser of  $P_{\text{PowerClass,CA}}$  and  $P_{\text{EMAX,CA}}$  shall not be exceeded by the UE during any period of time.

The measured maximum output power  $P_{\text{UMAX}}$  over all serving cells with same slot pattern shall be within the following range:

$$P_{\text{CMAX\_L}} - \text{MAX}\{T_L, T_{\text{LOW}}(P_{\text{CMAX\_L}})\} \leq P_{\text{UMAX}} \leq P_{\text{CMAX\_H}} + T_{\text{HIGH}}(P_{\text{CMAX\_H}})$$

$$P_{\text{UMAX}} = 10 \log_{10} \sum p_{\text{UMAX},c}$$

where  $p_{\text{UMAX},c}$  denotes the measured maximum output power for serving cell  $c$  expressed in linear scale. The tolerances  $T_{\text{LOW}}(P_{\text{CMAX}})$  and  $T_{\text{HIGH}}(P_{\text{CMAX}})$  for applicable values of  $P_{\text{CMAX}}$  are specified in Table 6.2A.4.1.1-1. The tolerance  $T_L$  is the absolute value of the lower tolerance for applicable NR CA configuration as specified in Table 6.2A.1.1-1 for intra-band carrier aggregation.

The measured maximum output power  $P_{\text{UMAX}}$  over all serving cells, when at least one slot has a different transmission numerology or slot pattern, shall be within the following range:

$$P'_{\text{CMAX\_L}} - \text{MAX}\{T_L, T_{\text{LOW}}(P'_{\text{CMAX\_L}})\} \leq P'_{\text{UMAX}} \leq P'_{\text{CMAX\_H}} + T_{\text{HIGH}}(P'_{\text{CMAX\_H}})$$

$$P'_{\text{UMAX}} = 10 \log_{10} \sum p'_{\text{UMAX},c}$$

where  $p'_{\text{UMAX},c}$  denotes the average measured maximum output power for serving cell  $c$  expressed in linear scale over  $T_{\text{REF}}$ . The tolerances  $T_{\text{LOW}}(P'_{\text{CMAX}})$  and  $T_{\text{HIGH}}(P'_{\text{CMAX}})$  for applicable values of  $P'_{\text{CMAX}}$  are specified in Table 6.2A.4.1.1-1 for intra-band carrier aggregation. The tolerance  $T_L$  is the absolute value of the lower tolerance for applicable NR CA configuration as specified in Table 6.2A.1.1-1 for intra-band carrier aggregation.

where:

$$P'_{\text{CMAX\_L}} = \text{MIN}\{ \text{MIN}\{10 \log_{10} \sum (p_{\text{CMAX\_L},f,c(i),i}), P_{\text{PowerClass,CA}}\} \text{ over all overlapping slots in } T_{\text{REF}}\}$$

$$P'_{\text{CMAX\_H}} = \text{MAX}\{ \text{MIN}\{10 \log_{10} \sum p_{\text{EMAX},c}, P_{\text{PowerClass,CA}}\} \text{ over all overlapping slots in } T_{\text{REF}}\}$$

**Table 6.2A.4.1.1-1:  $P_{\text{CMAX}}$  tolerance for uplink intra-band contiguous CA**

| $P_{\text{CMAX}}$<br>(dBm)        | Tolerance<br>$T_{\text{LOW}}(P_{\text{CMAX}})$<br>(dB) | Tolerance<br>$T_{\text{HIGH}}(P_{\text{CMAX}})$<br>(dB) |
|-----------------------------------|--------------------------------------------------------|---------------------------------------------------------|
| $23 < P_{\text{CMAX}} \leq 26$    | 3                                                      | 2                                                       |
| $21 \leq P_{\text{CMAX}} \leq 23$ | 2.0                                                    |                                                         |
| $20 \leq P_{\text{CMAX}} < 21$    | 2.5                                                    |                                                         |
| $19 \leq P_{\text{CMAX}} < 20$    | 3.5                                                    |                                                         |
| $18 \leq P_{\text{CMAX}} < 19$    | 4.0                                                    |                                                         |
| $13 \leq P_{\text{CMAX}} < 18$    | 5.0                                                    |                                                         |
| $8 \leq P_{\text{CMAX}} < 13$     | 6.0                                                    |                                                         |
| $-40 \leq P_{\text{CMAX}} < 8$    | 7.0                                                    |                                                         |

#### 6.2A.4.1.2 Configured transmitted power for Intra-band non-contiguous CA

For uplink carrier aggregation the UE is allowed to set its configured maximum output power  $P_{\text{CMAX},c}$  for serving cell  $c$  and its total configured maximum output power  $P_{\text{CMAX}}$ .

The configured maximum output power  $P_{\text{CMAX},c}$  on serving cell  $c$  shall be set as specified in subclause 6.2.4.

The configured maximum output power  $P_{\text{CMAX},c}$  on serving cell  $c$  shall be set as specified in subclause 6.2.4, but with  $\text{MPR}_c = \text{MPR}$  and  $\text{A-MPR}_c = \text{A-MPR}$  with  $\text{MPR}$  and  $\text{A-MPR}$  as determined by subclause 6.2A.2 and 6.2A.3, respectively. For PH reporting the following exception applies: if the UE is configured with multiple uplink serving cells, the power  $P_{\text{CMAX},c}$  used for the purpose of PH reporting on first serving cell  $c = c_1$  does not consider for computation of the PH report transmissions on a second serving cell  $c_2$  as exempted in subclause 7.7.1 in [8]. There is one power management term for the UE, denoted  $P\text{-MPR}$ , and  $P\text{-MPR } c = P\text{-MPR}$ .

The total configured maximum output power  $P_{\text{CMAX}}$  shall be set within the following bounds:

$$P_{\text{CMAX\_L}} \leq P_{\text{CMAX}} \leq P_{\text{CMAX\_H}}$$

For uplink intra-band non-contiguous carrier aggregation when same slot pattern is used in all aggregated serving cells,

$$P_{\text{CMAX\_L}} = \text{MIN}\{10 \log_{10} \sum p_{\text{EMAX},c} - \Delta T_C, P_{\text{EMAX},CA}, (P_{\text{PowerClass},CA} - \Delta P_{\text{PowerClass},CA}) - \text{MAX}(\text{MAX}(\text{MPR}_c, A\text{-MPR}_c) + \Delta T_{\text{IB},c} + \Delta T_C + \Delta T_{\text{RxsRS}}, P\text{-MPR})\}$$

$$P_{\text{CMAX\_H}} = \text{MIN}\{10 \log_{10} \sum p_{\text{EMAX},c}, P_{\text{EMAX},CA}, P_{\text{PowerClass},CA} - \Delta P_{\text{PowerClass},CA}\}$$

where

- $p_{\text{EMAX},c}$  is the linear value of  $P_{\text{EMAX},c}$  which is given by IE *P-Max* for serving cell  $c$  in [7];
- $P_{\text{PowerClass},CA}$  is the maximum UE power specified in Table 6.2A.1.2-1 without taking into account the tolerance;
- MPR and A-MPR are specified in subclause 6.2A.2 and subclause 6.2A.3 respectively;
- $\Delta P_{\text{PowerClass},CA} = 3$  dB for a power class 2 UE when the requirements of default power class are applied as specified in sub-clause 6.2.A.1.2; otherwise  $\Delta P_{\text{PowerClass},CA} = 0$  dB;
- $\Delta T_{\text{IB},c}$  is the additional tolerance for serving cell  $c$  as specified in clause 6.2A.4.2 for NR CA, clause 6.2C.2 for SUL, or TS 38.101-3 clause 6.2B.4.2 for EN-DC; In case the UE supports more than one of band combinations for CA, SUL or DC, and an operating band belongs to more than one band combinations then
  - a) When the operating band frequency range is  $\leq 1$  GHz, the applicable additional  $\Delta T_{\text{IB},c}$  shall be the average value for all band combinations defined in clause 6.2A.4.2, 6.2C.2 in this specification and 6.2B.4.2 in TS 38.101-3 [3], truncated to one decimal place that apply for that operating band among the supported band combinations. In case there is a harmonic relation between low band UL and high band DL, then the maximum  $\Delta T_{\text{IB},c}$  among the different supported band combinations involving such band shall be applied
  - b) When the operating band frequency range is  $> 1$  GHz, the applicable additional  $\Delta T_{\text{IB},c}$  shall be the maximum value for all band combinations defined in clause 6.2A.4.2, 6.2C.2 in this specification and 6.2B.4.2 in TS 38.101-3 [3] for the applicable operating bands.
- P-MPR is the power management term for the UE;
- $\Delta T_C$  is the highest value  $\Delta T_{C,c}$  among all serving cells  $c$ ;
- $\Delta T_{\text{RxsRS}}$  is the highest value among all serving cells  $c$ ;
- $P_{\text{EMAX},CA}$  is the value indicated by *p-NR-FR1* or by *p-UE-FR1* whichever is the smallest if both are present.

[For uplink intra-band non-contiguous carrier aggregation, when at least one different numerology/slot pattern is used in aggregated cells, the UE is allowed to set its configured maximum output power  $P_{\text{CMAX},c(i),i}$  for serving cell  $c(i)$  of slot numerology type  $i$ , and its total configured maximum output power  $P_{\text{CMAX}}$ .

The configured maximum output power  $P_{\text{CMAX},c(i),i}(p)$  in slot  $p$  of serving cell  $c(i)$  on slot numerology type  $i$  shall be set within the following bounds:

$$P_{\text{CMAX\_L},f,c(i),i}(p) \leq P_{\text{CMAX},f,c(i),i}(p) \leq P_{\text{CMAX\_H},f,c(i),i}(p)$$

where  $P_{\text{CMAX\_L},f,c(i),i}(p)$  and  $P_{\text{CMAX\_H},f,c(i),i}(p)$  are the limits for a serving cell  $c(i)$  of slot numerology type  $i$  as specified in subclause 6.2.4.

The total UE configured maximum output power  $P_{\text{CMAX}}(p,q)$  in a slot  $p$  of slot numerology or symbol pattern  $i$ , and a slot  $q$  of slot numerology or symbol pattern  $j$  that overlap in time shall be set within the following bounds unless stated otherwise:

$$P_{\text{CMAX\_L}}(p,q) \leq P_{\text{CMAX}}(p,q) \leq P_{\text{CMAX\_H}}(p,q)$$

When slots  $p$  and  $q$  have different transmissions lengths and belong to different cells on different or same bands:

$$P_{\text{CMAX\_L}}(p,q) = \text{MIN}\{10 \log_{10} [p_{\text{CMAX\_L},f,c(i),i}(p) + p_{\text{CMAX\_L},f,c(i),j}(q)], P_{\text{PowerClass},CA}, P_{\text{EMAX},CA}\}$$

$$P_{\text{CMAX\_H}}(p,q) = \text{MIN}\{10 \log_{10} [p_{\text{CMAX\_H},f,c(i),i}(p) + p_{\text{CMAX\_H},f,c(i),j}(q)], P_{\text{PowerClass},CA}, P_{\text{EMAX},CA}\}$$

where  $P_{\text{CMAX\_L},f,c(i),i}$  and  $P_{\text{CMAX\_H},f,c(i),i}$  are the respective limits  $P_{\text{CMAX\_L},f,c(i),i}$  and  $P_{\text{CMAX\_H},f,c(i),i}$  expressed in linear scale.]

$T_{\text{REF}}$  and  $T_{\text{eval}}$  are specified in Table 6.2A.4.1.2-1 when same and different slot patterns are used in aggregated carriers. For each  $T_{\text{REF}}$ , the  $P_{\text{CMAX\_L}}$  is evaluated per  $T_{\text{eval}}$  and given by the minimum value taken over the transmission(s) within the  $T_{\text{eval}}$ ; the minimum  $P_{\text{CMAX\_L}}$  over the one or more  $T_{\text{eval}}$  is then applied for the entire  $T_{\text{REF}}$ . The lesser of  $P_{\text{PowerClass,CA}}$  and  $P_{\text{EMAX,CA}}$  shall not be exceeded by the UE during any period of time.

**Table 6.2A.4.1.2-1:  $P_{\text{CMAX}}$  evaluation window for different slot and channel durations**

| $T_{\text{REF}}$                                           | $T_{\text{eval}}$       | $T_{\text{eval}}$ with frequency hopping                             |
|------------------------------------------------------------|-------------------------|----------------------------------------------------------------------|
| $T_{\text{REF}}$ of largest slot duration over both UL CCs | Physical channel length | $\text{Min}(T_{\text{no\_hopping}}, \text{Physical Channel Length})$ |

If the UE is configured with multiple TAGs and transmissions of the UE on slot  $i$  for any serving cell in one TAG overlap some portion of the first symbol of the transmission on slot  $i + 1$  for a different serving cell in another TAG, the UE minimum of  $P_{\text{CMAX\_L}}$  for slots  $i$  and  $i + 1$  applies for any overlapping portion of slots  $i$  and  $i + 1$ . The lesser of  $P_{\text{PowerClass,CA}}$  and  $P_{\text{EMAX,CA}}$  shall not be exceeded by the UE during any period of time.

The measured maximum output power  $P_{\text{UMAX}}$  over all serving cells with same slot pattern shall be within the following range:

$$P_{\text{CMAX\_L}} - \text{MAX}\{T_{\text{L}}, T_{\text{LOW}}(P_{\text{CMAX\_L}})\} \leq P_{\text{UMAX}} \leq P_{\text{CMAX\_H}} + T_{\text{HIGH}}(P_{\text{CMAX\_H}})$$

$$P_{\text{UMAX}} = 10 \log_{10} \sum p_{\text{UMAX},c}$$

where  $p_{\text{UMAX},c}$  denotes the measured maximum output power for serving cell  $c$  expressed in linear scale. The tolerances  $T_{\text{LOW}}(P_{\text{CMAX}})$  and  $T_{\text{HIGH}}(P_{\text{CMAX}})$  for applicable values of  $P_{\text{CMAX}}$  are specified in Table 6.2A.4.1.2-2. The tolerance  $T_{\text{L}}$  is the absolute value of the lower tolerance for applicable NR CA configuration as specified in Table 6.2A.1.2-1 for intra-band carrier aggregation.

The measured maximum output power  $P_{\text{UMAX}}$  over all serving cells, when at least one slot has a different transmission numerology or slot pattern, shall be within the following range:

$$P'_{\text{CMAX\_L}} - \text{MAX}\{T_{\text{L}}, T_{\text{LOW}}(P'_{\text{CMAX\_L}})\} \leq P'_{\text{UMAX}} \leq P'_{\text{CMAX\_H}} + T_{\text{HIGH}}(P'_{\text{CMAX\_H}})$$

$$P'_{\text{UMAX}} = 10 \log_{10} \sum p'_{\text{UMAX},c}$$

where  $p'_{\text{UMAX},c}$  denotes the average measured maximum output power for serving cell  $c$  expressed in linear scale over  $T_{\text{REF}}$ . The tolerances  $T_{\text{LOW}}(P'_{\text{CMAX}})$  and  $T_{\text{HIGH}}(P'_{\text{CMAX}})$  for applicable values of  $P'_{\text{CMAX}}$  are specified in Table 6.2A.4.1.2-2 for intra-band carrier aggregation. The tolerance  $T_{\text{L}}$  is the absolute value of the lower tolerance for applicable NR CA configuration as specified in Table 6.2A.1.2-1 for intra-band carrier aggregation.

where:

$$P'_{\text{CMAX\_L}} = \text{MIN}\{ \text{MIN}\{10 \log_{10} \sum (P_{\text{CMAX\_L},f,c(i),i}), P_{\text{PowerClass,CA}}\} \text{ over all overlapping slots in } T_{\text{REF}} \}$$

$$P'_{\text{CMAX\_H}} = \text{MAX}\{ \text{MIN}\{10 \log_{10} \sum P_{\text{EMAX},c}, P_{\text{PowerClass,CA}}\} \text{ over all overlapping slots in } T_{\text{REF}} \}$$

**Table 6.2A.4.1.2-2:  $P_{\text{CMAX}}$  tolerance for uplink intra-band non-contiguous CA**

| $P_{\text{CMAX}}$<br>(dBm)        | Tolerance<br>$T_{\text{LOW}}(P_{\text{CMAX}})$<br>(dB) | Tolerance<br>$T_{\text{HIGH}}(P_{\text{CMAX}})$<br>(dB) |
|-----------------------------------|--------------------------------------------------------|---------------------------------------------------------|
| $21 \leq P_{\text{CMAX}} \leq 26$ | 3.0                                                    | 2.0                                                     |
| $20 \leq P_{\text{CMAX}} < 21$    |                                                        | 2.5                                                     |
| $19 \leq P_{\text{CMAX}} < 20$    |                                                        | 3.5                                                     |
| $18 \leq P_{\text{CMAX}} < 19$    |                                                        | 4.0                                                     |
| $13 \leq P_{\text{CMAX}} < 18$    |                                                        | 5.0                                                     |
| $8 \leq P_{\text{CMAX}} < 13$     |                                                        | 6.0                                                     |
| $-40 \leq P_{\text{CMAX}} < 8$    |                                                        | 7.0                                                     |

### 6.2A.4.1.3 Configured transmitted power for Inter-band CA

For uplink carrier aggregation the UE is allowed to set its configured maximum output power  $P_{\text{CMAX},c}$  for serving cell  $c$  and its total configured maximum output power  $P_{\text{CMAX}}$ .

The configured maximum output power  $P_{\text{CMAX},c}$  on serving cell  $c$  shall be set as specified in clause 6.2.4, except that the UE power class for serving cell  $c$  on the specific operating band shall be determined by the *ue-PowerClassPerBandPerBC-r17* IE [7] as indicated for the band combination if signalled.

For uplink inter-band carrier aggregation,  $\text{MPR}_c$  and  $\text{A-MPR}_c$  apply per serving cell  $c$  and are specified in clause 6.2.2 and clause 6.2.3, respectively.  $\text{P-MPR}_c$  accounts for power management for serving cell  $c$ .  $P_{\text{CMAX},c}$  is calculated under the assumption that the transmit power is increased independently on all component carriers.

The total configured maximum output power  $P_{\text{CMAX}}$  shall be set within the following bounds:

$$P_{\text{CMAX}_L} \leq P_{\text{CMAX}} \leq P_{\text{CMAX}_H}$$

For uplink inter-band carrier aggregation with one serving cell  $c$  per operating band when same slot symbol pattern is used in all aggregated serving cells,

$$P_{\text{CMAX}_L} = \text{MIN} \{ 10 \log_{10} \sum \text{MIN} [ p_{\text{EMAX},c} / (\Delta t_{C,c}), p_{\text{PowerClass},c} / (\text{MAX}(\text{mpr}_c \cdot \Delta \text{mpr}_c, \text{a-mpr}_c) \cdot \Delta t_{C,c} \cdot \Delta t_{\text{IB},c} \cdot \Delta t_{\text{RxSRS},c}), p_{\text{PowerClass},c} / \text{pmp}_c ], P_{\text{EMAX},\text{CA}}, P_{\text{PowerClass},\text{CA}} - \Delta P_{\text{PowerClass},\text{CA}} \}$$

$$P_{\text{CMAX}_H} = \text{MIN} \{ 10 \log_{10} \sum p_{\text{EMAX},c}, P_{\text{EMAX},\text{CA}}, P_{\text{PowerClass},\text{CA}} - \Delta P_{\text{PowerClass},\text{CA}} \}$$

where

- $p_{\text{EMAX},c}$  is the linear value of  $P_{\text{EMAX},c}$  which is given by IE *P-Max* for serving cell  $c$  in [7];
- $P_{\text{PowerClass},\text{CA}}$  is the maximum UE power specified in Table 6.2A.1.3-1 without taking into account the tolerance specified in the Table 6.2A.1.3-1; If the UE indicates *higherPowerLimit-r17* for an eligible CA configuration as specified in Table 6.2A.1.3-1 and  $\Delta P_{\text{PowerClass},\text{CA}} = 0$ ,  $P_{\text{PowerClass},\text{CA}}$  is replaced by  $10 \log_{10} \sum p_{\text{PowerClass},c}$ .
- $p_{\text{PowerClass},c}$  is the linear value of the maximum UE power for serving cell  $c$  specified in Table 6.2.1-1 according to *ue-PowerClassPerBandPerBC-r17* if indicated or *ue-PowerClass* otherwise without taking into account the tolerance;
- $\Delta P_{\text{PowerClass},\text{CA}} = 3$  dB for a power class 2 UE when the requirements of default power class are applied as specified in sub-clause 6.2.A.1.3; otherwise  $\Delta P_{\text{PowerClass},\text{CA}} = 0$  dB;
- $\text{mpr}_c$  and  $\text{a-mpr}_c$  are the linear values of  $\text{MPR}_c$  and  $\text{A-MPR}_c$  as specified in clause 6.2.2 and clause 6.2.3, respectively;
- $\Delta \text{mpr}_c$  is the linear value of  $\Delta \text{MPR}_c$  as specified in clause 6.2.2;
- $\text{pmp}_c$  is the linear value of  $\text{P-MPR}_c$ ;
- $\Delta t_{\text{RxSRS},c}$  is the linear value of  $\Delta T_{\text{RxSRS},c}$ ;
- $\Delta t_{C,c}$  is the linear value of  $\Delta T_{C,c}$ .  $\Delta t_{C,c} = 1.41$  when NOTE 2 in Table 6.2A.1.3-1 applies for a serving cell  $c$ , otherwise  $\Delta t_{C,c} = 1$ ;
- $\Delta t_{\text{IB},c}$  is the linear value of the inter-band relaxation term  $\Delta T_{\text{IB},c}$  of the serving cell  $c$  as specified in clause 6.2A.4.2 for NR CA, clause 6.2C.2 for SUL, or TS 38.101-3 clause 6.2B.4.2 for EN-DC; otherwise  $\Delta t_{\text{IB},c} = 1$ ; In case the UE supports more than one of band combinations for CA, SUL or DC, and an operating band belongs to more than one band combinations then
  - a) When the operating band frequency range is  $\leq 1$  GHz, the applicable additional  $\Delta T_{\text{IB},c}$  shall be the average value for all band combinations defined in clause 6.2A.4.2, 6.2C.2 in this specification and 6.2B.4.2 in TS 38.101-3 [3], truncated to one decimal place that apply for that operating band among the supported band combinations. In case there is a harmonic relation between low band UL and high band DL, then the maximum  $\Delta T_{\text{IB},c}$  among the different supported band combinations involving such band shall be applied
  - b) When the operating band frequency range is  $> 1$  GHz, the applicable additional  $\Delta T_{\text{IB},c}$  shall be the maximum value for all band combinations defined in clause 6.2A.4.2, 6.2C.2 in this specification and 6.2B.4.2 in TS 38.101-3 [3] for the applicable operating bands.



- $P_{EMAX,CA}$  is the value indicated by *p-NR-FR1* or by *p-UE-FR1* whichever is the smallest if both are present. For uplink inter-band carrier aggregation with one serving cell  $c$  per operating band when at least one different numerology/slot pattern is used in aggregated cells, the UE is allowed to set its configured maximum output power  $P_{CMAX,c(i),i}$  for serving cell  $c(i)$  of slot numerology type  $i$ , and its total configured maximum output power  $P_{CMAX}$ .

The configured maximum output power  $P_{CMAX,c(i),i}(p)$  in slot  $p$  of serving cell  $c(i)$  on slot numerology type  $i$  shall be set within the following bounds:

$$P_{CMAX\_L,f,c(i),i}(p) \leq P_{CMAX,f,c(i),i}(p) \leq P_{CMAX\_H,f,c(i),i}(p)$$

where  $P_{CMAX\_L,f,c(i),i}(p)$  and  $P_{CMAX\_H,f,c(i),i}(p)$  are the limits for a serving cell  $c(i)$  of slot numerology type  $i$  as specified in clause 6.2.4, except that the UE power class for the serving cell  $c(i)$  on the specific operating band shall be determined by the *ue-PowerClassPerBandPerBC-r17* IE [7] as indicated for the band combination if signalled.

The total UE configured maximum output power  $P_{CMAX}(p,q)$  in a slot  $p$  of slot numerology or symbol pattern  $i$ , and a slot  $q$  of slot numerology or symbol pattern  $j$  that overlap in time shall be set within the following bounds unless stated otherwise:

$$P_{CMAX\_L}(p,q) \leq P_{CMAX}(p,q) \leq P_{CMAX\_H}(p,q)$$

When slots  $p$  and  $q$  have different transmissions lengths and belong to different cells on different bands:

$$P_{CMAX\_L}(p,q) = \text{MIN} \{10 \log_{10} [P_{CMAX\_L,f,c(i),i}(p) + P_{CMAX\_L,f,c(i),j}(q)], P_{PowerClass,CA}, P_{EMAX,CA}\}$$

$$P_{CMAX\_H}(p,q) = \text{MIN} \{10 \log_{10} [P_{CMAX\_H,f,c(i),i}(p) + P_{CMAX\_H,f,c(i),j}(q)], P_{PowerClass,CA}, P_{EMAX,CA}\}$$

where  $P_{CMAX\_L,f,c(i),i}$  and  $P_{CMAX\_H,f,c(i),i}$  are the respective limits  $P_{CMAX\_L,f,c(i),i}$  and  $P_{CMAX\_H,f,c(i),i}$  expressed in linear scale and  $P_{PowerClass,c}$  is the linear value of the maximum UE power for serving cell  $c$  specified in Table 6.2.1-1 according to *ue-PowerClassPerBandPerBC-r17* if indicated or *ue-PowerClass* otherwise without taking into account the tolerance; If the UE indicates *higherPowerLimit-r17*,  $P_{PowerClass,CA}$  is replaced by  $10 \log_{10} \sum P_{PowerClass,c}$ .

For combinations of intra-band and inter-band carrier aggregation with UE configured for transmission on three serving cells (up to two contiguously aggregated carriers per operating band), the following apply:

The UE power class for the serving cell(s) on the operating band  $B_i$  including intra-band carrier aggregation shall be determined by the *ue-PowerClassPerBandPerBC-r17* IE [7] as indicated for the band combination if signalled.

For the case when  $p$  and  $q$  belong to the same band and  $k$  belongs to a different band, but  $p$ ,  $q$  and  $k$  are of the same numerology and slot patterns.

$$P_{CMAX\_L} = \text{MIN} \{10 \log_{10} \sum (P_{CMAX\_L, B_i}), P_{EMAX,CA}, P_{PowerClass,CA}\}$$

$$P_{CMAX\_H} = \text{MIN} \{10 \log_{10} \sum P_{EMAX,c}, P_{EMAX,CA}, P_{PowerClass,CA}\}$$

Where

- $P_{CMAX\_L, B_i}$  is the linear values of  $P_{CMAX\_L}$  specified for the specific operating band  $B_i$ .
- The linear value of  $P_{CMAX\_L}$  specified for uplink intra-band contiguous carrier aggregation in subclause 6.2A.4.1.1 applies for operating band supporting two contiguous serving cells, designated by its band index  $B_i$ . The linear value of  $P_{CMAX\_L}$  specified for single carrier in subclause 6.2.4 applies for operating band  $B_j$  supporting one serving cell.

For the case when  $p$  and  $q$  belong to the same band and are of the same numerology  $i$  and slot patterns  $(p,q)$ , while  $k$  belong to a different band and is of different numerology  $j$  and/or slot pattern on the 3<sup>rd</sup> cell then:

$$P_{CMAX\_L}(p,q,k) = \text{MIN} \{10 \log_{10} [P_{CMAX\_L,B_i,i}(p,q) + P_{CMAX\_L,c(3),B_j,j}(k)], P_{EMAX,CA}, P_{PowerClass,CA}\}$$

$$P_{CMAX\_H}(p,q,k) = \text{MIN} \{10 \log_{10} [P_{CMAX\_H,B_i,i}(p,q) + P_{CMAX\_H,c(3),B_j,j}(k)], P_{EMAX,CA}, P_{PowerClass,CA}\}$$

Where

- $P_{EMAX,c}$  is the linear value of  $P_{EMAX,c}$  which is given by IE *P-Max* for serving cell  $c$  in [7];
- $P_{EMAX,CA}$  is *p-UE-FR1* value signalled by RRC and defined in [38.331];

- $P_{\text{PowerClass,CA}}$  is the maximum UE power specified in Table 6.2A.1.3-1 without taking into account the tolerance specified in the Table 6.2A.1.3-1 or Table 6.2F.1A.1-1 for shared spectrum bands;
- $p_{\text{CMAX\_L,c}(3),B_j}(k)$  and  $p_{\text{CMAX\_H,c}(3),B_j}(k)$  are the linear values of  $P_{\text{CMAX\_L}}$  and  $P_{\text{CMAX\_H}}$  respectively, specified for single carrier in subclause 6.2.4 and applies for operating band supporting one serving cell in the  $B_j$  band on numerology  $j$ , using slot pattern  $k$ ;
- $p_{\text{CMAX\_L,B}_i}(p,q)$  and  $p_{\text{CMAX\_H,B}_i}(p,q)$  are the linear values of  $P_{\text{CMAX\_L}}$  respectively  $P_{\text{CMAX\_H}}$  for uplink intra-band contiguous carrier aggregation specified in subclause 6.2A.4.1.1 which applies for operating band  $B_i$  on numerology  $i$ , supporting two contiguous serving cells, using the same slot pattern  $(p,q)$ .

$T_{\text{REF}}$  and  $T_{\text{eval}}$  are specified in Table 6.2A.4.1.3-0 when same and different slot patterns are used in aggregated carriers. For each  $T_{\text{REF}}$ , the  $P_{\text{CMAX\_L}}$  is evaluated per  $T_{\text{eval}}$  and given by the minimum value taken over the transmission(s) within the  $T_{\text{eval}}$ ; the minimum  $P_{\text{CMAX\_L}}$  over the one or more  $T_{\text{eval}}$  is then applied for the entire  $T_{\text{REF}}$ . The lesser of  $P_{\text{PowerClass,CA}}$  and  $P_{\text{EMAX,CA}}$  shall not be exceeded by the UE during any period of time.

**Table 6.2A.4.1.3-0:  $P_{\text{CMAX}}$  evaluation window for different slot and channel durations**

| $T_{\text{REF}}$                                           | $T_{\text{eval}}$       | $T_{\text{eval}}$ with frequency hopping                             |
|------------------------------------------------------------|-------------------------|----------------------------------------------------------------------|
| $T_{\text{REF}}$ of largest slot duration over both UL CCs | Physical channel length | $\text{Min}(T_{\text{no\_hopping}}, \text{Physical Channel Length})$ |

If the UE is configured with multiple TAGs and transmissions of the UE on slot  $i$  for any serving cell in one TAG overlap some portion of the first symbol of the transmission on slot  $i + 1$  for a different serving cell in another TAG, the UE minimum of  $P_{\text{CMAX\_L}}$  for slots  $i$  and  $i + 1$  applies for any overlapping portion of slots  $i$  and  $i + 1$ . The lesser of  $P_{\text{PowerClass,CA}}$  and  $P_{\text{EMAX,CA}}$  shall not be exceeded by the UE during any period of time.

The measured maximum output power  $P_{\text{UMAX}}$  over all serving cells with same slot pattern shall be within the following range:

$$P_{\text{CMAX\_L}} - \text{MAX}\{T_L, T_{\text{LOW}}(P_{\text{CMAX\_L}})\} \leq P_{\text{UMAX}} \leq P_{\text{CMAX\_H}} + T_{\text{HIGH}}(P_{\text{CMAX\_H}})$$

$$P_{\text{UMAX}} = 10 \log_{10} \sum p_{\text{UMAX},c}$$

where  $p_{\text{UMAX},c}$  denotes the measured maximum output power for serving cell  $c$  expressed in linear scale. The tolerances  $T_{\text{LOW}}(P_{\text{CMAX}})$  and  $T_{\text{HIGH}}(P_{\text{CMAX}})$  for applicable values of  $P_{\text{CMAX}}$  are specified in Table 6.2A.4.1.3-1. The tolerance  $T_L$  is the absolute value of the lower tolerance for applicable NR CA configuration as specified in Table 6.2A.1.3-1 for inter-band carrier aggregation.

The measured maximum output power  $P_{\text{UMAX}}$  over all serving cells, when at least one slot has a different transmission numerology or symbol pattern, shall be within the following range:

$$P'_{\text{CMAX\_L}} - \text{MAX}\{T_L, T_{\text{LOW}}(P'_{\text{CMAX\_L}})\} \leq P'_{\text{UMAX}} \leq P'_{\text{CMAX\_H}} + T_{\text{HIGH}}(P'_{\text{CMAX\_H}})$$

$$P'_{\text{UMAX}} = 10 \log_{10} \sum p'_{\text{UMAX},c}$$

where  $p'_{\text{UMAX},c}$  denotes the average measured maximum output power for serving cell  $c$  expressed in linear scale over  $T_{\text{REF}}$ . The tolerances  $T_{\text{LOW}}(P'_{\text{CMAX}})$  and  $T_{\text{HIGH}}(P'_{\text{CMAX}})$  for applicable values of  $P'_{\text{CMAX}}$  are specified in Table 6.2A.4.1.3-1 for inter-band carrier aggregation. The tolerance  $T_L$  is the absolute value of the lower tolerance for applicable NR CA configuration as specified in Table 6.2A.1.3-1 for inter-band carrier aggregation.

where:

$$P'_{\text{CMAX\_L}} = \text{MIN}\{ \text{MIN}\{10 \log_{10} \sum (p_{\text{CMAX\_L},f,c(i),i}), P_{\text{PowerClass,CA}}\} \text{ over all overlapping slots in } T_{\text{REF}}\}$$

$$P'_{\text{CMAX\_H}} = \text{MAX}\{ \text{MIN}\{10 \log_{10} \sum p_{\text{EMAX},c}, P_{\text{PowerClass,CA}}\} \text{ over all overlapping slots in } T_{\text{REF}}\}$$

If the UE indicates *higherPowerLimit-r17*,  $P_{\text{PowerClass,CA}}$  is replaced by  $10 \log_{10} \sum p_{\text{PowerClass},c}$

**Table 6.2A.4.1.3-1:  $P_{\text{CMAX}}$  tolerance for uplink inter-band CA (two bands)**

| $P_{\text{CMAX}}$<br>(dBm)        | Tolerance<br>$T_{\text{LOW}}(P_{\text{CMAX}})$<br>(dB) | Tolerance<br>$T_{\text{HIGH}}(P_{\text{CMAX}})$<br>(dB) |
|-----------------------------------|--------------------------------------------------------|---------------------------------------------------------|
| $23 \leq P_{\text{CMAX}} \leq 28$ | 3.0                                                    | 2.0                                                     |
| $22 \leq P_{\text{CMAX}} < 23$    | 5.0                                                    | 2.0                                                     |
| $21 \leq P_{\text{CMAX}} < 22$    | 5.0                                                    | 3.0                                                     |
| $20 \leq P_{\text{CMAX}} < 21$    | 5.0                                                    | 4.0                                                     |
| $16 \leq P_{\text{CMAX}} < 20$    | 5.0                                                    |                                                         |
| $11 \leq P_{\text{CMAX}} < 16$    | 6.0                                                    |                                                         |
| $-40 \leq P_{\text{CMAX}} < 11$   | 7.0                                                    |                                                         |

6.2A.4.1.4      Void

6.2A.4.2       $\Delta T_{\text{IB,c}}$  for CA

For the UE which supports inter-band NR CA configuration,  $\Delta T_{\text{IB,c}}$  in tables below applies. Unless otherwise stated,  $\Delta T_{\text{IB,c}}$  is set to zero.

6.2A.4.2.1      Void

6.2A.4.2.2      Void

6.2A.4.2.3       $\Delta T_{\text{IB,c}}$  for Inter-band CA (two bands)**Table 6.2A.4.2.3-1:  $\Delta T_{\text{IB,c}}$  due to NR CA (two bands)**

| Inter-band CA combination | NR Band | $\Delta T_{\text{IB,c}}$ (dB) |
|---------------------------|---------|-------------------------------|
| CA_n1-n3                  | n1      | 0.3                           |
|                           | n3      | 0.3                           |
| CA_n1-n5                  | n1      | 0.3                           |
|                           | n5      | 0.3                           |
| CA_n1-n7                  | n1      | 0.5                           |
|                           | n7      | 0.6                           |
| CA_n1-n8                  | n1      | 0.3                           |
|                           | n8      | 0.3                           |
| CA_n1-n18                 | n1      | 0.3                           |
|                           | n18     | 0.3                           |
| CA_n1-n20                 | n1      | 0.3                           |
|                           | n20     | 0.3                           |
| CA_n1-n28                 | n1      | 0.3                           |
|                           | n28     | 0.6                           |
| CA_n1-n38                 | n1      | 0.5                           |
|                           | n38     | 0.5                           |
| CA_n1-n40                 | n1      | 0.5                           |
|                           | n40     | 0.5                           |
| CA_n1-n41                 | n1      | 0.5                           |
|                           | n41     | 0.5                           |
| CA_n1-n67                 | n1      | 0.3                           |
| CA_n1-n74                 | n1      | 0.3                           |
|                           | n74     | 0.3                           |
| CA_n1-n77                 | n1      | 0.6                           |
|                           | n77     | 0.8                           |
| CA_n1-n78                 | n1      | 0.3                           |
|                           | n78     | 0.8                           |

|           |     |                  |
|-----------|-----|------------------|
| CA_n2-n5  | n2  | 0.3              |
|           | n5  | 0.3              |
| CA_n2-n7  | n2  | 0.5              |
|           | n7  | 0.5              |
| CA_n2-n12 | n2  | 0.3              |
|           | n12 | 0.3              |
| CA_n2-n14 | n2  | 0.3              |
|           | n14 | 0.3              |
| CA_n2-n29 | n2  | 0.3              |
| CA_n2-n30 | n2  | 0.5              |
|           | n30 | 0.3              |
| CA_n2-n48 | n2  | 0.6              |
|           | n48 | 0.8              |
| CA_n2-n66 | n2  | 0.5              |
|           | n66 | 0.5              |
| CA_n2-n77 | n2  | 0.6              |
|           | n77 | 0.8              |
| CA_n2-n78 | n2  | 0.6              |
|           | n78 | 0.8              |
| CA_n3-n5  | n3  | 0.3              |
|           | n5  | 0.3              |
| CA_n3-n7  | n3  | 0.5              |
|           | n7  | 0.5              |
| CA_n3-n8  | n3  | 0.3              |
|           | n8  | 0.3              |
| CA_n3-n18 | n3  | 0.3              |
|           | n18 | 0.3              |
| CA_n3-n20 | n3  | 0.3              |
|           | n20 | 0.3              |
| CA_n3-n28 | n3  | 0.3              |
|           | n28 | 0.3              |
| CA_n3-n34 | n3  | 0.5              |
|           | n34 | 0.5              |
| CA_n3-n38 | n3  | 0.5              |
|           | n38 | 0.5              |
| CA_n3-n40 | n3  | 0.5              |
|           | n40 | 0.5              |
| CA_n3-n41 | n3  | 0.5              |
|           | n41 | 0.3 <sup>4</sup> |
|           |     | 0.8 <sup>5</sup> |
| CA_n3-n74 | n3  | 0.8              |
|           | n74 | 0.9              |
| CA_n3-n77 | n3  | 0.6              |
|           | n77 | 0.8              |
| CA_n3-n78 | n3  | 0.6              |
|           | n78 | 0.8              |
| CA_n3-n79 | n3  | 0.3              |
|           | n79 | 0.8              |
| CA_n5-n7  | n5  | 0.3              |
|           | n7  | 0.3              |
| CA_n5-n12 | n5  | 0.8              |
|           | n12 | 0.4              |
| CA_n5-n14 | n5  | 0.5              |
|           | n14 | 0.5              |
| CA_n5-n25 | n5  | 0.3              |
|           | n25 | 0.3              |
| CA_n5-n28 | n5  | 0.7              |
|           | n28 | 0.7              |
| CA_n5-n29 | n5  | 0.5              |
| CA_n5-n30 | n5  | 0.3              |

|            |     |     |
|------------|-----|-----|
|            | n30 | 0.3 |
| CA_n5-n40  | n5  | 0.3 |
|            | n40 | 0.3 |
| CA_n5-n48  | n5  | 0.3 |
|            | n48 | 0.3 |
| CA_n5-n66  | n5  | 0.3 |
|            | n66 | 0.3 |
| CA_n5-n77  | n5  | 0.6 |
|            | n77 | 0.8 |
| CA_n5-n78  | n5  | 0.6 |
|            | n78 | 0.8 |
| CA_n7-n8   | n7  | 0.3 |
|            | n8  | 0.6 |
| CA_n7-n25  | n7  | 0.5 |
|            | n25 | 0.5 |
| CA_n7-n28  | n7  | 0.3 |
|            | n28 | 0.3 |
| CA_n7-n40  | n7  | 0.5 |
|            | n40 | 0.6 |
| CA_n7-n46  | n7  | 0.3 |
| CA_n7-n66  | n7  | 0.5 |
|            | n66 | 0.5 |
| CA_n7-n77  | n7  | 0.5 |
|            | n77 | 0.8 |
| CA_n7-n78  | n7  | 0.5 |
|            | n78 | 0.8 |
| CA_n7-n79  | n7  | 0.5 |
|            | n79 | 0.8 |
| CA_n8-n20  | n8  | 0.4 |
|            | n20 | 0.4 |
| CA_n8-n28  | n8  | 0.6 |
|            | n28 | 0.5 |
| CA_n8-n34  | n8  | 0.3 |
|            | n34 | 0.3 |
| CA_n8-n38  | n8  | 0.6 |
|            | n38 | 0.3 |
| CA_n8-n39  | n8  | 0.3 |
|            | n39 | 0.3 |
| CA_n8-n40  | n8  | 0.3 |
|            | n40 | 0.3 |
| CA_n8-n41  | n8  | 0.6 |
|            | n41 | 0.3 |
| CA_n8-n75  | n8  | 0.3 |
| CA_n8-n77  | n8  | 0.6 |
|            | n77 | 0.8 |
| CA_n8-n78  | n8  | 0.6 |
|            | n78 | 0.8 |
| CA_n8-n79  | n8  | 0.3 |
|            | n79 | 0.8 |
| CA_n12-n25 | n12 | 0.3 |
|            | n25 | 0.3 |
| CA_n12-n30 | n12 | 0.3 |
|            | n30 | 0.3 |
| CA_n12-n48 | n12 | 0.3 |
|            | n48 | 0.3 |
| CA_n12-n66 | n12 | 0.8 |
|            | n66 | 0.3 |
| CA_n12-n71 | n12 | 1   |
|            | n71 | 1   |
| CA_n12-n77 | n12 | 0.5 |

|            |     |                  |
|------------|-----|------------------|
|            | n77 | 0.8              |
| CA_n13-n25 | n13 | 0.3              |
|            | n25 | 0.3              |
| CA_n13-n66 | n13 | 0.3              |
|            | n66 | 0.3              |
| CA_n13-n77 | n13 | 0.5              |
|            | n78 | 0.8              |
| CA_n14-n30 | n14 | 0.3              |
|            | n30 | 0.3              |
| CA_n14-n66 | n14 | 0.3              |
|            | n66 | 0.3              |
| CA_n14-n77 | n14 | 0.5              |
|            | n77 | 0.8              |
| CA_n18-n28 | n18 | 0.5              |
|            | n28 | 0.5              |
| CA_n18-n41 | n18 | 0.3              |
|            | n41 | 0.3              |
| CA_n18-n74 | n18 | 0.3              |
|            | n74 | 0.3              |
| CA_n18-n77 | n18 | 0.3              |
|            | n77 | 0.8              |
| CA_n18-n78 | n18 | 0.3              |
|            | n78 | 0.8              |
| CA_n20-n28 | n20 | 0.5              |
|            | n28 | 0.5              |
| CA_n20-n40 | n20 | 0.3              |
|            | n40 | 0.3              |
| CA_n20-n75 | n20 | 0.3              |
| CA_n20-n78 | n20 | 0.6              |
|            | n78 | 0.8              |
| CA_n20-n67 | n20 | 0.5              |
| CA_n24-n41 | n24 | 0.3              |
|            | n41 | 0.4 <sup>6</sup> |
|            |     | 0.9 <sup>7</sup> |
| CA_n24-n48 | n24 | 0.6              |
|            | n48 | 0.8              |
| CA_n24-n77 | n24 | 0.6              |
|            | n77 | 0.8              |
| CA_n25-n29 | n25 | 0.3              |
| CA_n25-n38 | n25 | 0.5              |
|            | n38 | 0.5              |
| CA_n25-n41 | n25 | 0.5              |
|            | n41 | 0.4 <sup>6</sup> |
|            |     | 0.9 <sup>7</sup> |
| CA_n25-n48 | n25 | 0.6              |
|            | n48 | 0.8              |
| CA_n25-n66 | n25 | 0.5              |
|            | n66 | 0.5              |
| CA_n25-n71 | n25 | 0.3              |
|            | n71 | 0.6              |
| CA_n25-n77 | n25 | 0.6              |
|            | n77 | 0.8              |
| CA_n26-n66 | n26 | 0.3              |
|            | n66 | 0.3              |
| CA_n26-n70 | n26 | 0.3              |
|            | n70 | 0.3              |
| CA_n28-n34 | n28 | 0.3              |
|            | n34 | 0.3              |
| CA_n28-n38 | n28 | 0.3              |
|            | n38 | 0.3              |
| CA_n28-n39 | n28 | 0.3              |

|            |     |                  |
|------------|-----|------------------|
|            | n39 | 0.3              |
| CA_n28-n40 | n28 | 0.3              |
|            | n40 | 0.3              |
| CA_n28-n41 | n28 | 0.3              |
|            | n41 | 0.3              |
| CA_n28-n50 | n28 | 0.3              |
|            | n50 | 0.4              |
| CA_n28-n71 | n28 | 1.1              |
|            | n71 | 1.1              |
| CA_n28-n74 | n28 | 0.6              |
|            | n74 | 0.4              |
| CA_n28-n75 | n28 | 0.3              |
| CA_n28-n77 | n28 | 0.5              |
|            | n77 | 0.8              |
| CA_n28-n78 | n28 | 0.5              |
|            | n78 | 0.8              |
| CA_n28-n79 | n28 | 0.5              |
|            | n79 | 0.8              |
| CA_n29-n30 | n30 | 0.3              |
| CA_n29-n66 | n66 | 0.3              |
| CA_n29-n70 | n70 | 0.3              |
| CA_n29-n71 | n71 | 0.5              |
| CA_n29-n77 | n77 | 0.8              |
| CA_n34-n79 | n34 | 0.3              |
|            | n79 | 0.8              |
| CA_n30-n66 | n30 | 0.5              |
|            | n66 | 0.8              |
| CA_n30-n77 | n30 | 0.3              |
|            | n77 | 0.8              |
| CA_n34-n41 | n34 | 0.3              |
|            | n41 | 0.3              |
| CA_n34-n79 | n34 | 0.3              |
|            | n79 | 0.8              |
| CA_n38-n40 | n38 | 0.5 <sup>3</sup> |
|            | n40 | 0.5 <sup>3</sup> |
| CA_n38-n66 | n38 | 0.5              |
|            | n66 | 0.5              |
| CA_n38-n78 | n38 | 0.3              |
|            | n78 | 0.8              |
| CA_n38-n79 | n38 | 0.3              |
|            | n79 | 0.8              |
| CA_n39-n41 | n39 | 0 <sup>2</sup>   |
|            | n41 | 0 <sup>2</sup>   |
|            | n39 | 0.5 <sup>3</sup> |
|            | n41 | 0.5 <sup>3</sup> |
| CA_n39-n79 | n39 | 0.3              |
|            | n79 | 0.8              |
| CA_n40-n41 | n40 | 0.5 <sup>3</sup> |
|            | n41 | 0.5 <sup>3</sup> |
| CA_n40-n77 | n77 | 0.5              |
| CA_n40-n78 | n78 | 0.5              |
|            |     |                  |
|            |     |                  |
| CA_n40-n79 | n40 | 0.3              |
|            | n79 | 0.8              |
| CA_n41-n48 | n41 | 0.3              |
|            | n48 | 0.8              |
| CA_n41-n50 | n41 | 0.3              |
|            | n50 | 0.4              |
| CA_n41-n66 | n41 | 0.8 <sup>6</sup> |
|            |     | 1.3 <sup>7</sup> |

|                         |     |                  |
|-------------------------|-----|------------------|
|                         | n66 | 0.5              |
| CA_n41-n70              | n41 | 0.5              |
|                         | n70 | 0.5              |
| CA_n41-n71              | n41 | 0.3              |
|                         | n71 | 0.6              |
| CA_n41-n74              | n41 | 0.3              |
|                         | n74 | 0.3              |
| CA_n41-n77 <sup>1</sup> | n41 | 0.3              |
|                         | n77 | 0.8              |
| CA_n41-n78 <sup>1</sup> | n41 | 0.3              |
|                         | n78 | 0.8              |
| CA_n41-n79              | n41 | 0.3              |
|                         | n79 | 0.8              |
| CA_n46-n48              | n48 | 0.5              |
| CA_n46-n78              | n78 | 0.8              |
| CA_n46-n96              | n96 | 0.5              |
| CA_n48-n53              | n48 | 0.5 <sup>3</sup> |
|                         | n53 | 0.3 <sup>3</sup> |
| CA_n48-n66              | n48 | 0.8              |
|                         | n66 | 0.6              |
| CA_n48-n70              | n48 | 0.8              |
|                         | n70 | 0.6              |
| CA_n48-n71              | n48 | 0.3              |
|                         | n71 | 0.3              |
| CA_n48-n96              | n48 | 0.5              |
|                         | n96 | 0.5              |
| CA_n50-n78              | n50 | 0 <sup>2</sup>   |
|                         | n78 | 0 <sup>2</sup>   |
|                         | n50 | 0.5 <sup>3</sup> |
|                         | n78 | 0.5 <sup>3</sup> |
| CA_n66-n70              | n66 | 0.5              |
|                         | n70 | 0.5              |
| CA_n66-n71              | n66 | 0.3              |
|                         | n71 | 0.3              |
| CA_n66-n77              | n66 | 0.6              |
|                         | n77 | 0.8              |
| CA_n66-n78              | n66 | 0.6              |
|                         | n78 | 0.8              |
| CA_n70-n71              | n70 | 0.3              |
|                         | n71 | 0.6              |
| CA_n70-n78              | n70 | 0.6              |
|                         | n78 | 0.8              |
| CA_n71-n77              | n71 | 0.5              |
|                         | n77 | 0.8              |
| CA_n71-n78              | n71 | 0.5              |
|                         | n78 | 0.8              |
| CA_n74-n77              | n74 | 0.4              |
|                         | n77 | 0.8              |
| CA_n74-n78              | n74 | 0.4              |
|                         | n78 | 0.8              |
| CA_n75-n78              | n78 | 0.8              |
| CA_n76-n78              | n78 | 0.8              |
| CA_n77-n79              | n77 | 0.5              |
|                         | n79 | 0.5              |
| CA_n78-n79              | n78 | 0.5              |
|                         |     | 1.5 <sup>8</sup> |
|                         | n79 | 0.5              |
|                         |     | 1.5 <sup>8</sup> |
| CA_n78-n92              | n78 | 0.8              |
|                         | n92 | 0.6              |



- NOTE 1: The requirements only apply when the sub-frame and Tx-Rx timings are synchronized between the component carriers. In the absence of synchronization, the requirements are not within scope of these specifications.
- NOTE 2: Only applicable for UE supporting inter-band carrier aggregation with uplink in one NR band and without simultaneous Rx/Tx.
- NOTE 3: Applicable for UE supporting inter-band carrier aggregation without simultaneous Rx/Tx.
- NOTE 4: The requirement is applied for UE transmitting on the frequency range of 2515-2690 MHz.
- NOTE 5: The requirement is applied for UE transmitting on the frequency range of 2496-2515 MHz.
- NOTE 6: The requirement is applied for UE transmitting on the frequency range of 2545-2690 MHz.
- NOTE 7: The requirement is applied for UE transmitting on the frequency range of 2496-2545 MHz.
- NOTE 8: The requirements only apply for UE supporting inter-band carrier aggregation with simultaneous Rx/Tx capability, and NR UL carrier frequencies are confined to 3700 MHz-3800MHz for n78 and 4400 MHz-4500MHz for n79. Simultaneous Rx/Tx capability does not apply for UEs supporting band n78 with a n77 implementation.

**Table 6.2A.4.2.3-2: Void****Table 6.2A.4.2.3-3: Void**

#### 6.2A.4.2.4 $\Delta T_{IB,c}$ for Inter-band CA (three bands)

**Table 6.2A.4.2.4-1:  $\Delta T_{IB,c}$  due to NR CA (three bands)**

| Inter-band CA combination | NR Band | $\Delta T_{IB,c}$ (dB) |
|---------------------------|---------|------------------------|
| CA_n1-n3-n5               | n1      | 0.3                    |
|                           | n3      | 0.3                    |
|                           | n5      | 0.3                    |
| CA_n1-n3-n7               | n1      | 0.6                    |
|                           | n3      | 0.6                    |
|                           | n7      | 0.6                    |
| CA_n1-n3-n8               | n1      | 0.3                    |
|                           | n3      | 0.3                    |
|                           | n8      | 0.3                    |
| CA_n1-n3-n18              | n1      | 0.3                    |
|                           | n3      | 0.3                    |
|                           | n18     | 0.3                    |
| CA_n1-n3-n20              | n1      | 0.3                    |
|                           | n3      | 0.3                    |
|                           | n20     | 0.3                    |
| CA_n1-n3-n28              | n1      | 0.3                    |
|                           | n3      | 0.3                    |
|                           | n28     | 0.6                    |
| CA_n1-n3-n41              | n1      | 0.5                    |
|                           | n3      | 0.5                    |
|                           | n41     | 0.3 <sup>5</sup>       |
|                           |         | 0.8 <sup>6</sup>       |
| CA_n1-n3-n77              | n1      | 0.6                    |
|                           | n3      | 0.6                    |
|                           | n77     | 0.8                    |
| CA_n1-n3-n78              | n1      | 0.6                    |
|                           | n3      | 0.6                    |
|                           | n78     | 0.8                    |
| CA_n1-n3-n79              | n1      | 0.3                    |
|                           | n3      | 0.3                    |
|                           | n79     | 0.8                    |
| CA_n1-n5-n7               | n1      | 0.5                    |
|                           | n5      | 0.3                    |
|                           | n7      | 0.6                    |
| CA_n1-n5-n28              | n1      | 0.3                    |
|                           | n5      | 0.6                    |
|                           | n28     | 0.6                    |
| CA_n1-n5-n78              | n1      | 0.6                    |

|               |     |     |
|---------------|-----|-----|
|               | n5  | 0.6 |
|               | n78 | 0.8 |
| CA_n1-n7-n8   | n1  | 0.5 |
|               | n7  | 0.6 |
|               | n8  | 0.6 |
| CA_n1-n7-n28  | n1  | 0.5 |
|               | n7  | 0.6 |
|               | n28 | 0.6 |
| CA_n1-n7-n40  | n1  | 0.6 |
|               | n7  | 0.8 |
|               | n40 | 0.9 |
| CA_n1-n7-n78  | n1  | 0.6 |
|               | n7  | 0.6 |
|               | n78 | 0.8 |
| CA_n1-n7-n79  | n1  | 0.6 |
|               | n7  | 0.6 |
|               | n79 | 0.8 |
| CA_n1-n8-n28  | n1  | 0.3 |
|               | n8  | 0.6 |
|               | n28 | 0.6 |
| CA_n1-n8-n40  | n1  | 0.3 |
|               | n8  | 0.3 |
|               | n40 | 0.5 |
| CA_n1-n8-n77  | n1  | 0.3 |
|               | n8  | 0.6 |
|               | n77 | 0.8 |
| CA_n1-n8-n78  | n1  | 0.3 |
|               | n8  | 0.6 |
|               | n78 | 0.8 |
| CA_n1-n8-n79  | n1  | 0.3 |
|               | n8  | 0.6 |
|               | n79 | 0.8 |
| CA_n1-n18-n28 | n1  | 0.3 |
|               | n18 | 0.5 |
|               | n28 | 0.5 |
| CA_n1-n18-n41 | n1  | 0.5 |
|               | n18 | 0.3 |
|               | n41 | 0.5 |
| CA_n1-n18-n77 | n1  | 0.3 |
|               | n18 | 0.3 |
|               | n77 | 0.8 |
| CA_n1-n20-n67 | n1  | 0.5 |
|               | n20 | 0.6 |
|               | n67 | 0.6 |
| CA_n1-n20-n78 | n1  | 0.3 |
|               | n20 | 0.6 |
|               | n78 | 0.8 |
| CA_n1-n28-n38 | n1  | 0.5 |
|               | n28 | 0.6 |
|               | n38 | 0.5 |
| CA_n1-n28-n40 | n1  | 0.6 |
|               | n28 | 0.3 |
|               | n40 | 0.5 |
| CA_n1-n28-n41 | n1  | 0.5 |
|               | n28 | 0.6 |
|               | n41 | 0.6 |
| CA_n1-n28-n77 | n1  | 0.6 |
|               | n28 | 0.6 |
|               | n77 | 0.8 |
| CA_n1-n28-n78 | n1  | 0.3 |
|               | n28 | 0.6 |
|               | n78 | 0.8 |
| CA_n1-n28-n79 | n28 | 0.2 |
|               | n79 | 0.5 |
|               | n78 | 0.5 |
| CA_n1-n38-n78 | n1  | 0.5 |
|               | n38 | 0.5 |
|               | n78 | 0.5 |

|               |     |                  |
|---------------|-----|------------------|
|               | n78 | 0.8              |
| CA_n1-n40-n78 | n1  | 0.3              |
|               | n40 | 0.5              |
|               | n78 | 0.8              |
| CA_n1-n41-n77 | n1  | 0.5              |
|               | n41 | 0.5              |
|               | n77 | 0.8              |
| CA_n1-n77-n79 | n1  | 0.6              |
|               | n77 | 0.8              |
|               | n79 | 0.5              |
| CA_n1-n78-n79 | n1  | 0.3              |
|               | n78 | 0.8              |
|               |     | 1.5 <sup>7</sup> |
|               | n79 | 0.5              |
|               |     | 1.5 <sup>7</sup> |
| CA_n2-n5-n30  | n2  | 0.5              |
|               | n5  | 0.3              |
|               | n30 | 0.3              |
| CA_n2-n5-n48  | n2  | 0.6              |
|               | n5  | 0.3              |
|               | n48 | 0.8              |
| CA_n2-n5-n66  | n2  | 0.5              |
|               | n5  | 0.3              |
|               | n66 | 0.5              |
| CA_n2-n5-n77  | n2  | 0.6              |
|               | n5  | 0.8              |
|               | n77 | 0.8              |
| CA_n2-n12-n30 | n2  | 0.5              |
|               | n12 | 0.3              |
|               | n30 | 0.3              |
| CA_n2-n12-n66 | n2  | 0.5              |
|               | n12 | 0.8              |
|               | n66 | 0.5              |
| CA_n2-n12-n77 | n2  | 0.6              |
|               | n12 | 0.3              |
|               | n77 | 0.8              |
| CA_n2-n14-n30 | n2  | 0.5              |
|               | n14 | 0.3              |
|               | n30 | 0.5              |
| CA_n2-n14-n66 | n2  | 0.5              |
|               | n14 | 0.3              |
|               | n66 | 0.5              |
| CA_n2-n14-n77 | n2  | 0.5              |
|               | n14 | 0.3              |
|               | n77 | 0.8              |
| CA_n2-n29-n30 | n2  | 0.5              |
|               | n30 | 0.3              |
| CA_n2-n29-n66 | n2  | 0.5              |
|               | n66 | 0.5              |
| CA_n2-n29-n77 | n2  | 0.6              |
|               | n77 | 0.8              |
| CA_n2-n30-n66 | n2  | 0.5              |
|               | n30 | 0.3              |
|               | n66 | 0.5              |
| CA_n2-n30-n77 | n2  | 0.6              |
|               | n30 | 0.3              |
|               | n77 | 0.8              |
| CA_n2-n48-n66 | n2  | 0.6              |
|               | n48 | 0.8              |
|               | n66 | 0.6              |
| CA_n2-n48-n77 | n2  | 0.6              |
|               | n48 | 0.8              |
|               | n77 | 0.8              |
| CA_n2-n66-n77 | n2  | 0.6              |
|               | n66 | 0.6              |

|               |     |                                    |
|---------------|-----|------------------------------------|
|               | n77 | 0.8                                |
| CA_n2-n66-n78 | n2  | 0.6                                |
|               | n66 | 0.6                                |
|               | n78 | 0.8                                |
|               |     |                                    |
| CA_n2-n71-n78 | n2  | 0.6                                |
|               | n71 | 0.6                                |
|               | n78 | 0.8                                |
|               |     |                                    |
| CA_n3-n5-n7   | n3  | 0.5                                |
|               | n5  | 0.3                                |
|               | n7  | 0.5                                |
|               |     |                                    |
| CA_n3-n5-n28  | n3  | 0.3                                |
|               | n5  | 0.6                                |
|               | n28 | 0.5                                |
|               |     |                                    |
| CA_n3-n5-n78  | n3  | 0.6                                |
|               | n5  | 0.6                                |
|               | n78 | 0.8                                |
|               |     |                                    |
| CA_n3-n7-n8   | n3  | 0.5                                |
|               | n7  | 0.5                                |
|               | n8  | 0.6                                |
|               |     |                                    |
| CA_n3-n7-n28  | n3  | 0.5                                |
|               | n7  | 0.5                                |
|               | n28 | 0.3                                |
|               |     |                                    |
| CA_n3-n7-n78  | n3  | 0.6                                |
|               | n7  | 0.6                                |
|               | n78 | 0.8                                |
|               |     |                                    |
| CA_n3-n8-n28  | n3  | 0.3                                |
|               | n8  | 0.6                                |
|               | n28 | 0.5                                |
|               |     |                                    |
| CA_n3-n8-n41  | n3  | 0.5                                |
|               | n8  | 0.3                                |
|               | n41 | 0.3 <sup>1</sup>                   |
|               |     | 0.8 <sup>2</sup>                   |
| CA_n3-n8-n77  | n3  | 0.6                                |
|               | n8  | 0.6                                |
|               | n77 | 0.8                                |
|               |     |                                    |
| CA_n3-n8-n78  | n3  | 0.6                                |
|               | n8  | 0.6                                |
|               | n78 | 0.8                                |
|               |     |                                    |
| CA_n3-n8-n79  | n3  | 0.3                                |
|               | n8  | 0.3                                |
|               | n79 | 0.5                                |
|               |     |                                    |
| CA_n3-n18-n28 | n3  | 0.3                                |
|               | n18 | 0.5                                |
|               | n28 | 0.3                                |
|               |     |                                    |
| CA_n3-n18-n41 | n3  | 0.5                                |
|               | n18 | 0.3                                |
|               | n41 | 0.3 <sup>1</sup> /0.8 <sup>2</sup> |
|               |     |                                    |
| CA_n3-n18-n77 | n3  | 0.6                                |
|               | n18 | 0.3                                |
|               | n77 | 0.8                                |
|               |     |                                    |
| CA_n3-n20-n67 | n3  | 0.3                                |
|               | n20 | 0.5                                |
|               |     |                                    |
|               |     |                                    |
| CA_n3-n20-n78 | n3  | 0.6                                |
|               | n20 | 0.6                                |
|               | n78 | 0.8                                |
|               |     |                                    |
| CA_n3-n28-n41 | n3  | 0.5                                |
|               | n28 | 0.3                                |
|               | n41 | 0.3 <sup>1</sup> /0.8 <sup>2</sup> |
|               |     |                                    |
| CA_n3-n28-n77 | n3  | 0.6                                |
|               | n28 | 0.5                                |
|               | n77 | 0.8                                |
|               |     |                                    |
| CA_n3-n28-n78 | n3  | 0.5                                |
|               | n28 | 0.3                                |
|               | n78 | 0.8                                |
|               |     |                                    |
| CA_n3-n28-n79 | n3  | 0.3                                |

|               |     |                                    |
|---------------|-----|------------------------------------|
|               | n28 | 0.5                                |
|               | n79 | 0.8                                |
| CA_n3-n38-n40 | n3  | 0.5                                |
|               | n38 | 0.5 <sup>1,3</sup>                 |
|               | n40 | 0.5                                |
| CA_n3-n40-n41 | n3  | 0.5                                |
|               | n40 | 0.5                                |
|               | n41 | 0.5 <sup>1,3</sup>                 |
| CA_n3-n41-n77 | n3  | 0.6                                |
|               | n41 | 0.3 <sup>1</sup> /0.8 <sup>2</sup> |
|               | n77 | 0.8                                |
| CA_n3-n41-n78 | n3  | 0.6                                |
|               | n41 | 0.3 <sup>1</sup> /0.8 <sup>2</sup> |
|               | n78 | 0.8                                |
| CA_n3-n41-n79 | n3  | 0.3                                |
|               | n41 | 0.3 <sup>1</sup>                   |
|               |     | 0.8 <sup>2</sup>                   |
| CA_n3-n77-n79 | n79 | 0.8                                |
|               | n3  | 0.6                                |
|               | n77 | 0.8                                |
| CA_n5-n7-n28  | n5  | 0.5                                |
|               | n7  | 0.3                                |
|               | n28 | 0.6                                |
| CA_n5-n7-n78  | n5  | 0.6                                |
|               | n7  | 0.6                                |
|               | n78 | 0.8                                |
| CA_n5-n12-n77 | n5  | 0.8                                |
|               | n12 | 0.4                                |
|               | n77 | 0.5                                |
| CA_n5-n14-n77 | n5  | 0.5                                |
|               | n14 | 0.3                                |
|               | n77 | 0.8                                |
| CA_n5-n25-n66 | n5  | 0.3                                |
|               | n25 | 0.5                                |
|               | n66 | 0.5                                |
| CA_n5-n25-n77 | n5  | 0.6                                |
|               | n25 | 0.6                                |
|               | n77 | 0.8                                |
| CA_n5-n25-n78 | n5  | 0.6                                |
|               | n25 | 0.6                                |
|               | n78 | 0.8                                |
| CA_n5-n29-n77 | n5  | 0.8                                |
|               | n77 | 0.5                                |
| CA_n5-n30-n66 | n5  | 0.3                                |
|               | n30 | 0.3                                |
|               | n66 | 0.5                                |
| CA_n5-n30-n77 | n5  | 0.6                                |
|               | n30 | 0.3                                |
|               | n77 | 0.8                                |
| CA_n5-n40-n78 | n5  | 0.6                                |
|               | n40 | 0.5                                |
|               | n78 | 0.8                                |
| CA_n5-n48-n66 | n5  | 0.3                                |
|               | n48 | 0.8                                |
|               | n66 | 0.6                                |
| CA_n5-n48-n77 | n5  | 0.6                                |
|               | n48 | 0.8                                |
|               | n77 | 0.8                                |
| CA_n5-n66-n77 | n5  | 0.6                                |
|               | n66 | 0.6                                |
|               | n77 | 0.8                                |
| CA_n5_n66-n78 | n5  | 0.6                                |
|               | n66 | 0.6                                |
|               | n78 | 0.8                                |

|                  |     |                  |
|------------------|-----|------------------|
| CA_n7-n8-n28     | n7  | 0.3              |
|                  | n8  | 0.6              |
|                  | n28 | 0.5              |
| CA_n7-n8-n40     | n7  | 0.5              |
|                  | n8  | 0.6              |
|                  | n40 | 0.6              |
| CA_n7-n8-n78     | n7  | 0.5              |
|                  | n8  | 0.6              |
|                  | n78 | 0.8              |
| CA_n7_n25-n66    | n7  | 0.5              |
|                  | n25 | 0.5              |
|                  | n66 | 0.5              |
| CA_n7-n25-n77    | n7  | 0.5              |
|                  | n25 | 0.6              |
|                  | n77 | 0.8              |
| CA_n7-n25-n78    | n7  | 0.5              |
|                  | n25 | 0.6              |
|                  | n78 | 0.8              |
| CA_n7_n28-n78    | n7  | 0.3              |
|                  | n28 | 0.3              |
|                  | n78 | 0.8              |
| CA_n7-n46-n78    | n7  | 0.5              |
|                  | n78 | 0.8              |
| CA_n7-n66-n77    | n7  | 0.5              |
|                  | n66 | 0.6              |
|                  | n77 | 0.8              |
| CA_n7_n66-n78    | n7  | 0.5              |
|                  | n66 | 0.6              |
|                  | n78 | 0.8              |
| CA_n8-n28-n78    | n8  | 0.6              |
|                  | n28 | 0.5              |
|                  | n78 | 0.8              |
| CA_n8A-n38A-n40A | n8  | 0.3              |
|                  | n38 | 0.3              |
|                  | n40 | 0.3              |
| CA_n8-n39-n41    | n8  | 0.6              |
|                  | n39 | 0.5 <sup>4</sup> |
|                  | n41 | 0.5 <sup>4</sup> |
| CA_n8-n39-n79    | n8  | 0.3              |
|                  | n39 | 0.3              |
| CA_n8-n40-n41    | n8  | 0.3              |
|                  | n40 | 0.3 <sup>3</sup> |
|                  | n41 | 0.3 <sup>3</sup> |
| CA_n8-n40-n78    | n8  | 0.6              |
|                  | n40 | 0.3              |
|                  | n78 | 0.8              |
| CA_n8-n41-n79    | n8  | 0.6              |
|                  | n41 | 0.3              |
|                  | n79 | 0.8              |
| CA_n8-n78-n79    | n8  | 0.6              |
|                  | n78 | 0.8              |
|                  | n79 | 0.8              |
| CA_n12-n30-n66   | n12 | 0.8              |
|                  | n30 | 0.3              |
|                  | n66 | 0.5              |
| CA_n12-n30-n77   | n12 | 0.5              |
|                  | n30 | 0.3              |
|                  | n77 | 0.5              |
| CA_n12-n66-n77   | n12 | 0.8              |
|                  | n66 | 0.6              |
|                  | n77 | 0.8              |
| CA_n13-n25-n66   | n13 | 0.3              |
|                  | n25 | 0.5              |
|                  | n66 | 0.5              |
| CA_n13-n25-n77   | n13 | 0.3              |

|                |     |                  |
|----------------|-----|------------------|
|                | n25 | 0.6              |
|                | n77 | 0.8              |
| CA_n13-n66-n77 | n13 | 0.5              |
|                | n66 | 0.6              |
|                | n77 | 0.8              |
| CA_n14-n30-n66 | n14 | 0.3              |
|                | n30 | 0.3              |
|                | n66 | 0.5              |
| CA_n14-n30-n77 | n14 | 0.5              |
|                | n30 | 0.3              |
|                | n77 | 0.8              |
| CA_n14-n66-n77 | n14 | 0.6              |
|                | n66 | 0.6              |
|                | n77 | 0.8              |
| CA_n18-n28-n41 | n18 | 0.4              |
|                | n28 | 0.4              |
|                | n41 | 0.3              |
| CA_n18-n28-n77 | n18 | 0.5              |
|                | n28 | 0.5              |
|                | n77 | 0.8              |
| CA_n18-n41-n77 | n18 | 0.3              |
|                | n41 | 0.3              |
|                | n77 | 0.8              |
| CA_n20-n28-n78 | n20 | 0.6              |
|                | n28 | 0.5              |
|                | n78 | 0.8              |
| CA_n24-n41-n48 | n24 | 0.6              |
|                | n41 | 0.4 <sup>1</sup> |
|                |     | 0.9 <sup>2</sup> |
|                | n48 | 0.8              |
| CA_n24-n41-n77 | n24 | 0.6              |
|                | n41 | 0.4 <sup>5</sup> |
|                |     | 0.9 <sup>6</sup> |
|                | n77 | 0.8              |
| CA_n24-n48-n77 | n24 | 0.6              |
|                | n48 | 0.8              |
|                | n77 | 0.8              |
| CA_n25-n29-n66 | n25 | 0.5              |
|                | n66 | 0.5              |
| CA_n25-n38-n78 | n25 | 0.5              |
|                | n38 | 0.4              |
|                | n78 | 0.8              |
| CA_n25-n41-n66 | n25 | 0.5              |
|                | n41 | 0.8 <sup>5</sup> |
|                |     | 1.3 <sup>6</sup> |
|                | n66 | 0.5              |
| CA_n25-n41-n71 | n25 | 0.5              |
|                | n41 | 0.5              |
|                | n71 | 0.6              |
| CA_n25-n41-n77 | n25 | 0.5              |
|                | n41 | 0.5              |
|                | n77 | 0.6              |
| CA_n25-n41-n78 | n25 | 0.6              |
|                | n41 | 0.5              |
|                | n78 | 0.8              |
| CA_n25-n48-n66 | n25 | 0.6              |
|                | n48 | 0.8              |
|                | n66 | 0.6              |
| CA_n25-n66-n71 | n25 | 0.5              |
|                | n66 | 0.5              |
|                | n71 | 0.6              |
| CA_n25-n66-n77 | n25 | 0.6              |
|                | n66 | 0.6              |
|                | n77 | 0.8              |
| CA_n25-n66-n78 | n25 | 0.6              |

|                |     |                  |
|----------------|-----|------------------|
|                | n66 | 0.6              |
|                | n78 | 0.8              |
| CA_n25-n71-n77 | n25 | 0.6              |
|                | n71 | 0.6              |
|                | n77 | 0.8              |
| CA_n25-n71-n78 | n25 | 0.6              |
|                | n71 | 0.6              |
|                | n78 | 0.8              |
| CA_n26-n66-n70 | n26 | 0.3              |
|                | n66 | 0.5              |
|                | n70 | 0.5              |
| CA_n28-n38-n78 | n28 | 0.5              |
|                | n38 | 0.3              |
|                | n78 | 0.8              |
| CA_n28-n39-n40 | n28 | 0.3              |
|                | n39 | 0.3              |
|                | n40 | 0.3              |
| CA_n28-n39-n41 | n28 | 0.3              |
|                | n39 | 0.5              |
|                | n41 | 0.5              |
| CA_n28-n39-n79 | n28 | 0.5              |
|                | n39 | 0.3              |
|                | n79 | 0.8              |
| CA_n28-n40-n41 | n28 | 0.3              |
|                | n40 | 0.5              |
|                | n41 | 0.5              |
| CA_n28-n40-n78 | n28 | 0.5              |
|                | n40 | 0.3              |
|                | n78 | 0.8              |
| CA_n28-n40-n79 | n28 | 0.5              |
|                | n40 | 0.3              |
|                | n79 | 0.8              |
| CA_n28-n41-n77 | n28 | 0.5              |
|                | n41 | 0.3              |
|                | n77 | 0.8              |
| CA_n28-n41-n78 | n28 | 0.5              |
|                | n41 | 0.3              |
|                | n78 | 0.8              |
| CA_n28-n41-n79 | n28 | 0.5              |
|                | n41 | 0.3              |
|                | n79 | 0.8              |
| CA_n28-n46-n78 | n28 | 0.5              |
|                | n78 | 0.8              |
| CA_n28-n77-n79 | n28 | 0.5              |
|                | n77 | 0.8              |
|                | n79 | 0.5              |
| CA_n28-n78-n79 | n28 | 0.5              |
|                | n78 | 0.8              |
|                |     | 1.5 <sup>7</sup> |
|                | n79 | 0.5              |
| CA_n29-n30-n66 | n30 | 0.3              |
|                | n66 | 0.5              |
| CA_n29-n30-n77 | n30 | 0.3              |
|                | n77 | 0.5              |
| CA_n29-n66-n70 | n66 | 0.5              |
|                | n70 | 0.5              |
| CA_n29-n66-n77 | n66 | 0.6              |
|                | n77 | 0.8              |
| CA_n30-n66-n77 | n30 | 0.3              |
|                | n66 | 0.6              |
|                | n77 | 0.8              |
| CA_n38-n66-n78 | n38 | 0.5              |
|                | n66 | 0.5              |
|                | n78 | 0.8              |



|                |     |                  |
|----------------|-----|------------------|
| CA_n39-n40-n41 | n39 | 0.3              |
|                | n40 | 0.3              |
|                | n41 | 0.3              |
| CA_n39-n40-n79 | n39 | 0.3              |
|                | n79 | 0.8              |
| CA_n39-n41-n79 | n39 | 0.3              |
|                | n41 | 0.3 <sup>4</sup> |
|                | n79 | 0.8 <sup>4</sup> |
| CA_n40-n41-n79 | n40 | 0.5 <sup>3</sup> |
|                | n41 | 0.5 <sup>3</sup> |
|                | n79 | 0.8              |
| CA_n41-n66-n71 | n41 | 0.8 <sup>5</sup> |
|                |     | 1.3 <sup>6</sup> |
|                | n66 | 0.5              |
|                | n71 | 0.3              |
| CA_n41-n66-n77 | n41 | 0.5              |
|                | n66 | 0.6              |
|                | n77 | 0.8              |
|                |     |                  |
| CA_n41-n66-n78 | n41 | 0.5              |
|                | n66 | 0.6              |
|                | n78 | 0.8              |
| CA_n41-n70-n78 | n41 | 0.6              |
|                | n70 | 0.6              |
|                | n78 | 0.8              |
| CA_n41-n71-n77 | n41 | 0.3              |
|                | n71 | 0.5              |
|                | n77 | 0.8              |
| CA_n41-n71-n78 | n41 | 0.3              |
|                | n71 | 0.5              |
|                | n78 | 0.8              |
| CA_n46-n48-n96 | n46 | 0.5              |
|                | n48 | 0.8              |
|                | n96 | 0.6              |
| CA_n48-n66-n70 | n48 | 0.8              |
|                | n66 | 0.6              |
|                | n70 | 0.6              |
| CA_n48-n66-n71 | n48 | 0.5              |
|                | n66 | 0.5              |
|                | n71 | 0.3              |
| CA_n48-n66-n77 | n48 | 0.8              |
|                | n66 | 0.6              |
|                | n77 | 0.8              |
| CA_n48-n70-n71 | n48 | 0.5              |
|                | n70 | 0.5              |
|                | n71 | 0.3              |
| CA_n66-n70-n71 | n66 | 0.5              |
|                | n70 | 0.5              |
|                | n71 | 0.6              |
| CA_n66-n71-n77 | n66 | 0.6              |
|                | n71 | 0.6              |
|                | n77 | 0.8              |
| CA_n66-n71-n78 | n66 | 0.6              |
|                | n71 | 0.5              |
|                | n78 | 0.8              |

NOTE 1: The requirement is applied for UE transmitting on the frequency range of 2515-2690 MHz.

NOTE 2: The requirement is applied for UE transmitting on the frequency range of 2496-2515 MHz.

NOTE 3: Only applicable for UE supporting inter-band carrier aggregation without simultaneous Rx/Tx among band 40 and 41.

NOTE 4: Applicable for UE supporting inter-band carrier aggregation without simultaneous Rx/Tx between n39 and n41.

NOTE 5: The requirement is applied for UE transmitting on the frequency range of 2545 - 2690 MHz.

NOTE 6: The requirement is applied for UE transmitting on the frequency range of 2496 - 2545 MHz.

NOTE 7: The requirements only apply for UE supporting inter-band carrier aggregation with simultaneous Rx/Tx capability, and NR UL carrier frequencies are confined to 3700 MHz-

3800MHz for n78 and 4400 MHz-4500MHz for n79. Simultaneous Rx/Tx capability does not apply for UEs supporting band n78 with a n77 implementation.

#### 6.2A.4.2.5 $\Delta T_{IB,c}$ for Inter-band CA (four bands)

**Table 6.2A.4.2.5-1:  $\Delta T_{IB,c}$  due to NR CA (four bands)**

| Inter-band CA combination | NR Band | $\Delta T_{IB,c}$ (dB) |
|---------------------------|---------|------------------------|
| CA_n1-n3-n5-n7            | n1      | 0.6                    |
|                           | n3      | 0.6                    |
|                           | n5      | 0.3                    |
| CA_n1-n3-n5-n78           | n1      | 0.6                    |
|                           | n3      | 0.6                    |
|                           | n5      | 0.3                    |
|                           | n78     | 0.8                    |
| CA_n1-n3-n7-n28           | n1      | 0.6                    |
|                           | n3      | 0.6                    |
|                           | n7      | 0.6                    |
|                           | n28     | 0.6                    |
| CA_n1-n3-n7-n78           | n1      | 0.7                    |
|                           | n3      | 0.7                    |
|                           | n7      | 0.7                    |
|                           | n78     | 0.8                    |
| CA_n1-n3-n8-n78           | n1      | 0.6                    |
|                           | n3      | 0.6                    |
|                           | n8      | 0.6                    |
|                           | n78     | 0.8                    |
| CA_n1-n3-n8-n77           | n1      | 0.6                    |
|                           | n3      | 0.6                    |
|                           | n8      | 0.6                    |
|                           | n77     | 0.8                    |
| CA_n1-n3-n18-n28          | n1      | 0.3                    |
|                           | n3      | 0.3                    |
|                           | n18     | 0.5                    |
|                           | n28     | 0.5                    |
| CA_n1-n3-n18-n41          | n1      | 0.5                    |
|                           | n3      | 0.5                    |
|                           | n18     | 0.3                    |
|                           | n41     | 0.3 <sup>3</sup>       |
|                           |         | 0.8 <sup>4</sup>       |
| CA_n1-n3-n18-n77          | n1      | 0.6                    |
|                           | n3      | 0.6                    |
|                           | n18     | 0.3                    |
|                           | n77     | 0.8                    |
|                           |         | 0.8                    |
| CA_n1-n3-n28-n41          | n1      | 0.5                    |
|                           | n3      | 0.5                    |
|                           | n28     | 0.5                    |
|                           | n41     | 0.3 <sup>3</sup>       |
|                           |         | 0.8 <sup>4</sup>       |
| CA_n1-n3-n28-n77          | n1      | 0.6                    |
|                           | n3      | 0.6                    |
|                           | n28     | 0.6                    |
|                           | n77     | 0.8                    |
|                           |         | 0.8                    |
| CA_n1-n3-n28-n78          | n1      | 0.6                    |
|                           | n3      | 0.6                    |
|                           | n28     | 0.6                    |
|                           | n78     | 0.8                    |
|                           |         | 0.8                    |
| CA_n1-n3-n28-n79          | n1      | 0.3                    |
|                           | n3      | 0.3                    |
|                           | n28     | 0.6                    |
|                           | n79     | 0.8                    |
|                           |         | 0.8                    |
| CA_n1-n3-n41-n77          | n1      | 0.6                    |
|                           | n3      | 0.6                    |

|                   |     |                  |
|-------------------|-----|------------------|
|                   | n41 | 0.3 <sup>3</sup> |
|                   |     | 0.8 <sup>4</sup> |
|                   | n77 | 0.8              |
| CA_n1-n3-n77-n79  | n1  | 0.6              |
|                   | n3  | 0.6              |
|                   | n77 | 0.8              |
|                   | n79 | 0.8              |
| CA_n1-n5-n7-n78   | n1  | 0.6              |
|                   | n5  | 0.6              |
|                   | n7  | 0.6              |
|                   | n78 | 0.8              |
| CA_n1-n7-n8-n40   | n1  | 0.6              |
|                   | n7  | 0.8              |
|                   | n8  | 0.6              |
|                   | n40 | 0.9              |
| CA_n1-n7-n8-n78   | n1  | 0.6              |
|                   | n7  | 0.6              |
|                   | n8  | 0.6              |
|                   | n78 | 0.8              |
| CA_n1-n7-n28-n78  | n1  | 0.6              |
|                   | n7  | 0.6              |
|                   | n28 | 0.6              |
|                   | n78 | 0.8              |
| CA_n1-n7-n40-n78  | n1  | 0.6              |
|                   | n7  | 0.5              |
|                   | n40 | 0.5              |
|                   | n78 | 0.8              |
| CA_n1-n8-n40-n78  | n1  | 0.5              |
|                   | n8  | 0.3              |
|                   | n40 | 0.5              |
|                   | n78 | 0.8              |
| CA_n1-n8-n78-n79  | n1  | 0.3              |
|                   | n8  | 0.6              |
|                   | n78 | 0.8              |
|                   | n79 | 0.5              |
| CA_n1-n18-n28-n41 | n1  | 0.6              |
|                   | n18 | 0.5              |
|                   | n28 | 0.6              |
|                   | n41 | 0.5              |
| CA_n1-n18-n28-n77 | n1  | 0.6              |
|                   | n18 | 0.5              |
|                   | n28 | 0.6              |
|                   | n77 | 0.8              |
| CA_n1-n18-n41-n77 | n1  | 0.5              |
|                   | n18 | 0.5              |
|                   | n41 | 0.5              |
|                   | n77 | 0.8              |
| CA_n1-n28-n40-n78 | n1  | 0.3              |
|                   | n28 | 0.6              |
|                   | n40 | 0.5              |
|                   | n78 | 0.8              |
| CA_n1-n28-n41-n77 | n1  | 0.6              |
|                   | n28 | 0.6              |
|                   | n41 | 0.6              |
|                   | n77 | 0.8              |
| CA_n1-n28-n77-n79 | n1  | 0.6              |
|                   | n28 | 0.6              |
|                   | n77 | 0.8              |
|                   | n79 | 0.8              |
| CA_n2-n5-n30-n66  | n2  | 0.5              |
|                   | n5  | 0.3              |
|                   | n30 | 0.3              |
|                   | n66 | 0.5              |
| CA_n2-n5-n30-n77  | n2  | 0.6              |
|                   | n5  | 0.6              |

|                   |     |     |
|-------------------|-----|-----|
|                   | n30 | 0.3 |
|                   | n77 | 0.8 |
| CA_n2-n5-n48-n66  | n2  | 0.6 |
|                   | n5  | 0.3 |
|                   | n48 | 0.8 |
|                   | n66 | 0.6 |
| CA_n2-n5-n48-n77  | n2  | 0.6 |
|                   | n5  | 0.3 |
|                   | n48 | 0.8 |
|                   | n77 | 0.8 |
| CA_n2-n5-n66-n77  | n2  | 0.5 |
|                   | n5  | 0.3 |
|                   | n66 | 0.5 |
|                   | n77 | 0.8 |
| CA_n2-n12-n30-n66 | n2  | 0.5 |
|                   | n12 | 0.8 |
|                   | n30 | 0.3 |
|                   | n66 | 0.5 |
| CA_n2-n12-n30-n77 | n2  | 0.6 |
|                   | n12 | 0.5 |
|                   | n30 | 0.3 |
|                   | n77 | 0.8 |
| CA_n2-n12-n66-n77 | n2  | 0.6 |
|                   | n12 | 0.8 |
|                   | n66 | 0.6 |
|                   | n77 | 0.8 |
| CA_n2-n14-n30-n66 | n2  | 0.5 |
|                   | n14 | 0.3 |
|                   | n30 | 0.3 |
|                   | n66 | 0.5 |
| CA_n2-n14-n30-n77 | n2  | 0.6 |
|                   | n14 | 0.5 |
|                   | n30 | 0.3 |
|                   | n77 | 0.8 |
| CA_n2-n14-n66-n77 | n2  | 0.6 |
|                   | n14 | 0.6 |
|                   | n66 | 0.6 |
|                   | n77 | 0.8 |
| CA_n2-n29-n30-n66 | n2  | 0.5 |
|                   | n30 | 0.3 |
|                   | n66 | 0.5 |
| CA_n2-n29-n30-n77 | n2  | 0.6 |
|                   | n30 | 0.3 |
|                   | n77 | 0.8 |
| CA_n2-n29-n66-n77 | n2  | 0.6 |
|                   | n66 | 0.6 |
|                   | n77 | 0.8 |
| CA_n2-n48-n66-n77 | n2  | 0.6 |
|                   | n48 | 0.8 |
|                   | n66 | 0.6 |
|                   | n77 | 0.8 |
| CA_n2-n66-n71-n78 | n2  | 0.5 |
|                   | n66 | 0.5 |
|                   | n71 | 0.3 |
|                   | n78 | 0.5 |
| CA_n3-n5-n7-n78   | n3  | 0.6 |
|                   | n5  | 0.6 |
|                   | n7  | 0.6 |
|                   | n78 | 0.8 |
| CA_n3-n7-n28-n78  | n3  | 0.6 |
|                   | n7  | 0.6 |
|                   | n28 | 0.6 |
|                   | n78 | 0.6 |
| CA_n3-n18-n28-n41 | n3  | 0.5 |
|                   | n18 | 0.4 |

|                    |     |                                    |
|--------------------|-----|------------------------------------|
|                    | n28 | 0.4                                |
|                    | n41 | 0.3 <sup>3</sup>                   |
|                    |     | 0.8 <sup>4</sup>                   |
| CA_n3-n18-n28-n77  | n3  | 0.6                                |
|                    | n18 | 0.5                                |
|                    | n28 | 0.5                                |
|                    | n77 | 0.8                                |
| CA_n3-n18-n41-n77  | n3  | 0.6                                |
|                    | n18 | 0.4                                |
|                    | n41 | 0.3 <sup>3</sup>                   |
|                    |     | 0.8 <sup>4</sup>                   |
|                    | n77 | 0.8                                |
| CA_n3-n28-n41-n77  | n3  | 1                                  |
|                    | n28 | 0.5                                |
|                    | n41 | 0.3 <sup>1</sup> /0.8 <sup>2</sup> |
|                    | n77 | 0.8                                |
| CA_n3-n28-n41-n78  | n3  | 1                                  |
|                    | n28 | 0.5                                |
|                    | n41 | 0.3 <sup>1</sup> /0.8 <sup>2</sup> |
|                    | n78 | 0.8                                |
| CA_n3-n28-n77-n79  | n3  | 0.6                                |
|                    | n28 | 0.5                                |
|                    | n77 | 0.8                                |
|                    | n79 | 0.8                                |
| CA_n5-n25-n66-n77  | n5  | 0.6                                |
|                    | n25 | 0.6                                |
|                    | n66 | 0.6                                |
|                    | n77 | 0.8                                |
| CA_n5-n25-n66-n78  | n5  | 0.6                                |
|                    | n25 | 0.6                                |
|                    | n66 | 0.6                                |
|                    | n78 | 0.8                                |
| CA_n5-n30-n66-n77  | n5  | 0.6                                |
|                    | n30 | 0.3                                |
|                    | n66 | 0.6                                |
|                    | n77 | 0.8                                |
| CA_n5-n48-n66-n77  | n5  | 0.6                                |
|                    | n48 | 0.8                                |
|                    | n66 | 0.6                                |
|                    | n77 | 0.8                                |
| CA_n7-n8-n40-n78   | n7  | 0.5                                |
|                    | n8  | 0.3                                |
|                    | n40 | 0.5                                |
|                    | n78 | 0.8                                |
| CA_n7-n25-n66-n77  | n7  | 0.5                                |
|                    | n25 | 0.6                                |
|                    | n66 | 0.6                                |
|                    | n77 | 0.8                                |
| CA_n7-n25-n66-n78  | n7  | 0.5                                |
|                    | n25 | 0.6                                |
|                    | n66 | 0.6                                |
|                    | n78 | 0.8                                |
| CA_n12-n30-n66-n77 | n12 | 0.8                                |
|                    | n30 | 0.3                                |
|                    | n66 | 0.6                                |
|                    | n77 | 0.8                                |
| CA_n13-n25-n66-n77 | n13 | 0.5                                |
|                    | n25 | 0.6                                |
|                    | n66 | 0.6                                |
|                    | n77 | 0.8                                |
| CA_n14-n30-n66-n77 | n14 | 0.6                                |
|                    | n30 | 0.3                                |
|                    | n66 | 0.6                                |
|                    | n77 | 0.8                                |
| CA_n18-n28-n41-n77 | n18 | 0.5                                |

|                    |     |                                    |
|--------------------|-----|------------------------------------|
|                    | n28 | 0.5                                |
|                    | n41 | 0.3 <sup>3</sup>                   |
|                    |     | 0.8 <sup>4</sup>                   |
|                    | n77 | 0.8                                |
| CA_n25-n38-n66-n78 | n25 | 0.6                                |
|                    | n38 | 0.6                                |
|                    | n66 | 0.6                                |
|                    | n78 | 0.8                                |
| CA_n25-n41-n66-n71 | n25 | 0.5                                |
|                    | n41 | 0.5                                |
|                    | n66 | 0.5                                |
|                    | n71 | 0.3                                |
| CA_n25-n41-n66-n77 | n25 | 0.5                                |
|                    | n41 | 0.8 <sup>3</sup> /1.3 <sup>4</sup> |
|                    | n66 | 0.5                                |
|                    | n77 | 0.8                                |
| CA_n25-n41-n66-n78 | n25 | 0.5                                |
|                    | n41 | 0.8 <sup>3</sup> /1.3 <sup>4</sup> |
|                    | n66 | 0.5                                |
|                    | n78 | 0.8                                |
| CA_n25-n41-n71-n77 | n25 | 0.5                                |
|                    | n41 | 0.5                                |
|                    | n71 | 0.6                                |
|                    | n77 | 0.8                                |
| CA_n25-n41-n71-n78 | n25 | 0.5                                |
|                    | n41 | 0.5                                |
|                    | n71 | 0.6                                |
|                    | n78 | 0.8                                |
| CA_n25-n66-n71-n77 | n25 | 0.5                                |
|                    | n66 | 0.5                                |
|                    | n71 | 0.6                                |
|                    | n77 | 0.8                                |
| CA_n25-n66-n71-n78 | n25 | 0.6                                |
|                    | n66 | 0.6                                |
|                    | n71 | 0.6                                |
|                    | n78 | 0.8                                |
| CA_n29-n30-n66-n77 | n30 | 0.3                                |
|                    | n66 | 0.6                                |
|                    | n77 | 0.8                                |
| CA_n41-n66-n70-n78 | n41 | 0.5                                |
|                    | n66 | 0.6                                |
|                    | n70 | 0.6                                |
|                    | n78 | 0.8                                |
| CA_n41-n66-n71-n77 | n41 | 0.3 <sup>3</sup> /0.8 <sup>4</sup> |
|                    | n66 | 1                                  |
|                    | n71 | 0.5                                |
|                    | n77 | 0.8                                |
| CA_n41-n66-n71-n78 | n41 | 0.3 <sup>3</sup> /0.8 <sup>4</sup> |
|                    | n66 | 1                                  |
|                    | n71 | 0.5                                |
|                    | n78 | 0.8                                |

NOTE 1: Applicable for the frequency range of 2515-2690 MHz.  
NOTE 2: Applicable for the frequency range of 2496-2515 MHz  
NOTE 3: The requirement is applied for UE transmitting on the frequency range of 2545 - 2690 MHz.  
NOTE 4: The requirement is applied for UE transmitting on the frequency range of 2496 - 2545 MHz

#### 6.2A.4.2.6 $\Delta T_{IB,C}$ for Inter-band CA (five bands)

**Table 6.2A.4.2.6-1:  $\Delta T_{IB,C}$  due to NR CA (five bands)**

| Inter-band CA combination | NR Band | $\Delta T_{IB,C}$ (dB) |
|---------------------------|---------|------------------------|
|---------------------------|---------|------------------------|

|                      |     |     |
|----------------------|-----|-----|
| CA_n1-n3-n5-n7-n78   | n1  | 0.6 |
|                      | n3  | 0.6 |
|                      | n5  | 0.6 |
|                      | n7  | 0.6 |
|                      | n78 | 0.8 |
| CA_n1-n3-n7-n28-n78  | n1  | 0.7 |
|                      | n3  | 0.7 |
|                      | n7  | 0.7 |
|                      | n28 | 0.6 |
|                      | n78 | 0.8 |
| CA_n2-n5-n48-n66-n77 | n2  | 0.6 |
|                      | n5  | 0.3 |
|                      | n48 | 0.8 |
|                      | n66 | 0.6 |
|                      | n77 | 0.8 |

## 6.2B Transmitter power for NR-DC

### 6.2B.0 General

The requirements apply for inter-band NR-DC with one uplink serving cell configured per CG.

### 6.2B.1 UE maximum output power for NR-DC

For inter-band NR-DC with one uplink carrier assigned per NR band, the transmitter power requirements in clause 6.2 apply per band.

For inter-band NR-DC with one uplink assigned per band, the UE maximum output power shall be measured over all component carriers from different bands. If each band has separate antenna connectors, the maximum output power is defined as the sum of maximum output power from each UE antenna connector. The period of measurement shall be at least one sub frame (1 ms). The maximum output power is specified in Table 6.2B.1.3-1.

**Table 6.2B.1.3-1 UE Power Class for inter-band NR-DC**

| Uplink CA Configuration | Class 1 (dBm) | Tolerance (dB) | Class 2 (dBm) | Tolerance (dB) | Class 3 (dBm) | Tolerance (dB) | Class 5 (dBm) | Tolerance (dB) |
|-------------------------|---------------|----------------|---------------|----------------|---------------|----------------|---------------|----------------|
| DC_n1A-n3A              |               |                |               |                | 23            | +2/-3          |               |                |
| DC_n1A-n7A              |               |                |               |                | 23            | +2/-3          |               |                |
| DC_n1A-n28A             |               |                |               |                | 23            | +2/-3          |               |                |
| DC_n1A-n41A             |               |                |               |                | 23            | +2/-3          |               |                |
| DC_n1A-n77A             |               |                |               |                | 23            | +2/-3          |               |                |
| DC_n1A-n78A             |               |                |               |                | 23            | +2/-3          |               |                |
| DC_n1A-n79A             |               |                |               |                | 23            | +2/-3          |               |                |
| DC_n2A-n5A              |               |                |               |                | 23            | +2/-3          |               |                |
| DC_n2A-n48A             |               |                |               |                | 23            | +2/-3          |               |                |
| DC_n2A-n66A             |               |                |               |                | 23            | +2/-3          |               |                |
| DC_n2A-n77A             |               |                |               |                | 23            | +2/-3          |               |                |
| DC_n3A-n28A             |               |                |               |                | 23            | +2/-3          |               |                |
| DC_n3A-n41A             |               |                |               |                | 23            | +2/-3          |               |                |
| DC_n3A-n77A             |               |                |               |                | 23            | +2/-3          |               |                |
| DC_n3A-n78A             |               |                |               |                | 23            | +2/-3          |               |                |
| DC_n3A-n79A             |               |                |               |                | 23            | +2/-3          |               |                |
| DC_n5A-n48A             |               |                |               |                | 23            | +2/-3          |               |                |
| DC_n5A-n66A             |               |                |               |                | 23            | +2/-3          |               |                |
| DC_n5A-n77A             |               |                |               |                | 23            | +2/-3          |               |                |
| DC_n7A-n46A             |               |                |               |                | 23            | +2/-3          |               |                |
| DC_n7A-n78A             |               |                |               |                | 23            | +2/-3          |               |                |
| DC_n28A-n41A            |               |                |               |                | 23            | +2/-3          |               |                |
| DC_n28A-n46A            |               |                |               |                | 23            | +2/-3          |               |                |
| DC_n28A-n77A            |               |                |               |                | 23            | +2/-3          |               |                |
| DC_n28A-n78A            |               |                |               |                | 23            | +2/-3          |               |                |

|              |  |  |  |    |       |  |  |
|--------------|--|--|--|----|-------|--|--|
| DC_n28A-n79A |  |  |  | 23 | +2/-3 |  |  |
| DC_n41A-n77A |  |  |  | 23 | +2/-3 |  |  |
| DC_n41A-n78A |  |  |  | 23 | +2/-3 |  |  |
| DC_n46A-n48A |  |  |  | 23 | +2/-3 |  |  |
| DC_n46A-n48B |  |  |  | 23 | +2/-3 |  |  |
| DC_n46A-n78A |  |  |  | 23 | +2/-3 |  |  |
| DC_n48A-n66A |  |  |  | 23 | +2/-3 |  |  |
| DC_n48A-n70A |  |  |  | 23 | +2/-3 |  |  |
| DC_n48A-n71A |  |  |  | 23 | +2/-3 |  |  |
| DC_n48A-n96A |  |  |  | 23 | +2/-3 |  |  |
| DC_n48B-n96A |  |  |  | 23 | +2/-3 |  |  |
| DC_n66A-n77A |  |  |  | 23 | +2/-3 |  |  |
| DC_n77A-n79A |  |  |  | 23 | +2/-3 |  |  |

NOTE 1: An uplink DC configuration in which at least one of the bands has NOTE 3 in Table 6.2.1-1 is allowed to reduce the lower tolerance limit by 1.5 dB when the transmission bandwidths of at least one of the bands is confined within  $F_{UL\_low}$  and  $F_{UL\_low} + 4$  MHz or  $F_{UL\_high} - 4$  MHz and  $F_{UL\_high}$ .

NOTE 2:  $P_{PowerClass}$  is the maximum UE power specified without account of the tolerance

NOTE 3: The maximum power requirement applies to the total transmitted power over both the MCG and SCG.

NOTE 4: Power class 3 is the default power class unless otherwise stated.

## 6.2B.2 UE maximum output power reduction for NR-DC

For inter-band NR-DC with one uplink assigned per band, the requirements in clause 6.2.2 or 6.2F.2 when the uplink belongs to a spectrum sharing defined band apply for each uplink component carrier.

When inter-band NR-DC is configured with intra-band contiguous carrier aggregation in one of the cell groups or both, the requirements in clause 6.2A.2 apply for each cell group configured with uplink contiguous carrier aggregation.

## 6.2B.3 UE additional maximum output power reduction for NR-DC

For inter-band NR-DC with one uplink assigned per band, the requirements in clause 6.2.3 apply for each uplink component carrier.

For inter-band NR-DC with one uplink assigned per band, the requirements in clause 6.2.3 or 6.2F.3 when the uplink belongs to a spectrum sharing defined band apply for each uplink component carrier.

For inter-band NR-DC where the corresponding inter-band CA configuration is specified in Table 6.2A.3.1.3-1, the combined requirements and allowed A-MPR are applicable on both bands when both component carriers are active.

When inter-band NR-DC is configured with intra-band contiguous carrier aggregation in one of the cell groups or both, the requirements in clause 6.2A.3 or 6.2F.3A for shared spectrum defined bands, are applicable for each cell group configured with uplink contiguous carrier aggregation.

## 6.2B.4 Configured output power for NR-DC

### 6.2B.4.1 Configured transmitted power level for NR-DC

The UE is allowed to set its configured maximum output power  $P_{CMAX,f,c,MCG}$  and  $P_{CMAX,f,c,SCG}$  for the respective MCG and SCG and its total configured maximum output power for NR-DC operation  $P_{Total}^{NR-DC} = 10 \log_{10}(\hat{P}_{Total}^{NR-DC})$  with  $\hat{P}_{Total}^{NR-DC}$  as specified in clause 7.6.2 of [8]. The UE is configured with an inter-CG power sharing mode by *NR-DC-PC-mode*. The requirements apply for one uplink serving cell configured per CG and for asynchronous and synchronous NR-DC if not otherwise stated.

Unless otherwise stated, the configured maximum output power  $P_{CMAX,f,c,MCG}(q)$  in physical-channel  $q$  for carrier  $f$  of serving cell  $c$  shall be set within the bounds if contained in the MCG,

$$P_{CMAX\_L,f,c,MCG}(q) \leq P_{CMAX,f,c,MCG}(q) \leq P_{CMAX\_H,f,c,MCG}(q)$$

and the corresponding  $P_{CMAX\_L,f,c,SCG}(q)$  for a serving cell contained in the SCG,

$$P_{CMAX\_L,f,c,SCG}(q) \leq P_{CMAX,f,c,SCG}(q) \leq P_{CMAX\_H,f,c,SCG}(q)$$



where  $P_{\text{CMAX\_L},f,c,\text{MCG}}$ ,  $P_{\text{CMAX\_H},f,c,\text{MCG}}$ ,  $P_{\text{CMAX\_L},f,c,\text{SCG}}$  and  $P_{\text{CMAX\_H},f,c,\text{SCG}}$  are the limits for a serving cell  $c$  as specified in clause 6.2.4 modified as follows:

$$P_{\text{CMAX\_L},f,c,\text{MCG}} = \text{MIN}\{\text{MIN}(P_{\text{EMAX},c}, P_{\text{EMAX,NR-DC}}, P_{\text{NR}}) - \Delta T_{C,c}, (P_{\text{PowerClass,NR-DC}} - \Delta P_{\text{PowerClass,NR-DC}}) - \text{MAX}(\text{MAX}(\text{MPR}_c + \Delta \text{MPR}_c, A - \text{MPR}_c) + \Delta T_{\text{IB},c} + \Delta T_{C,c} + \Delta T_{\text{RxSRS}}, P - \text{MPR}_c)\}$$

$$P_{\text{CMAX\_H},f,c,\text{MCG}} = \text{MIN}\{P_{\text{EMAX},c}, P_{\text{EMAX,NR-DC}}, P_{\text{NR}}, P_{\text{PowerClass,NR-DC}} - \Delta P_{\text{PowerClass,NR-DC}}\}$$

for the MCG and

$$P_{\text{CMAX\_L},f,c,\text{SCG}} = \text{MIN}\{\text{MIN}(P_{\text{EMAX},c}, P_{\text{EMAX,NR-DC}}, P_{\text{NR}}) - \Delta T_{C,c}, (P_{\text{PowerClass,NR-DC}} - \Delta P_{\text{PowerClass,NR-DC}}) - \text{MAX}(\text{MAX}(\text{MPR}_c + \Delta \text{MPR}_c, A - \text{MPR}_c) + \Delta T_{\text{IB},c} + \Delta T_{C,c} + \Delta T_{\text{RxSRS}}, P - \text{MPR}_c)\}$$

$$P_{\text{CMAX\_H},f,c,\text{SCG}} = \text{MIN}\{P_{\text{EMAX},c}, P_{\text{EMAX,NR-DC}}, P_{\text{NR}}, P_{\text{PowerClass,NR-DC}} - \Delta P_{\text{PowerClass,NR-DC}}\}$$

for the SCG, where

- $P_{\text{EMAX,NR-DC}}$  is the value given by the field *p-UE-FR1* of the *PhysicalCellGroupConfig* IE for the MCG as defined in [7];
- $P_{\text{NR}}$  is the value given by the field *p-NR-FR1* of the *PhysicalCellGroupConfig* IE as defined in [7];
- $P_{\text{PowerClass,NR-DC}}$  is the maximum UE power specified in Table 6.2B.1.3-1 without taking into account the tolerance specified in the Table 6.2B.1.3-1;
- $\Delta T_{\text{IB},c}$  is the additional tolerance for serving cell  $c$  as specified in clause 6.2B.4.2 for NR-DC;  $\Delta T_{\text{IB},c} = 0$  dB otherwise;
- $\Delta T_{C,c} = 1.5$  dB when NOTE 2 in Table 6.2B.1.3-1 applies for a serving cell  $c$ , otherwise  $\Delta T_{C,c} = 0$  dB ;
- $\Delta \text{MPR}_c$  for serving cell  $c$  is specified in clause 6.2.2.
- $\Delta P_{\text{PowerClass,NR-DC}} = 0$  dB for a power class 3 UE.

When MSG or SCG are configured with intra-band contiguous carrier aggregation, then intra-band carrier aggregation  $P_{\text{CMAX,CA,MCG}}(q)$  and/or  $P_{\text{CMAX,CA,SCG}}(q)$  in physical-channel  $q$  shall be set within the bounds:

$$P_{\text{CMAX\_L},\text{CA},\text{MCG}}(q) \leq P_{\text{CMAX,CA,MCG}}(q) \leq P_{\text{CMAX\_H},\text{CA},\text{MCG}}(q)$$

for MSG, and/or

$$P_{\text{CMAX\_L},\text{CA},\text{SCG}}(q) \leq P_{\text{CMAX,CA,SCG}}(q) \leq P_{\text{CMAX\_H},\text{CA},\text{SCG}}(q)$$

for SCG, where  $P_{\text{CMAX\_L},\text{CA,MCG}}$ ,  $P_{\text{CMAX\_H},\text{CA,MCG}}$ ,  $P_{\text{CMAX,CA,SCG}}$  and  $P_{\text{CMAX\_H},\text{CA,SCG}}$  are the limits for a carrier aggregation uplink as specified in clause 6.2A.4.1.1 modified as follows:

$$P_{\text{CMAX\_L},\text{CA,MCG}} = \text{MIN}\{10 \log_{10} \sum p_{\text{EMAX},c} - \Delta T_C, P_{\text{EMAX,CA}}, P_{\text{EMAX,NR-DC}}, P_{\text{NR,MCG}}, (P_{\text{PowerClass,NR-DC}} - \Delta P_{\text{PowerClass,NR-DC}}) - \text{MAX}(\text{MAX}(\text{MPR}, A - \text{MPR}) + \Delta T_{\text{IB},c} + \Delta T_C + \Delta T_{\text{RxSRS}}, P - \text{MPR}_c)\}$$

$$P_{\text{CMAX\_H},\text{CA,MCG}} = \text{MIN}\{10 \log_{10} \sum p_{\text{EMAX},c}, P_{\text{EMAX,CA}}, P_{\text{EMAX,NR-DC}}, P_{\text{NR,MCG}}, P_{\text{PowerClass,NR-DC}} - \Delta P_{\text{PowerClass,NR-DC}}\}$$

for the MCG, and

$$P_{\text{CMAX\_L},\text{CA,SCG}} = \text{MIN}\{10 \log_{10} \sum p_{\text{EMAX},c} - \Delta T_C, P_{\text{EMAX,CA}}, P_{\text{EMAX,NR-DC}}, P_{\text{NR,SCG}}, (P_{\text{PowerClass,NR-DC}} - \Delta P_{\text{PowerClass,NR-DC}}) - \text{MAX}(\text{MAX}(\text{MPR}, A - \text{MPR}) + \Delta T_{\text{IB},c} + \Delta T_C + \Delta T_{\text{RxSRS}}, P - \text{MPR}_c)\}$$

$$P_{\text{CMAX\_H},\text{CA,SCG}} = \text{MIN}\{10 \log_{10} \sum p_{\text{EMAX},c}, P_{\text{EMAX,CA}}, P_{\text{EMAX,NR-DC}}, P_{\text{NR,SCG}}, P_{\text{PowerClass,NR-DC}} - \Delta P_{\text{PowerClass,NR-DC}}\}$$

for SCG.

For a UE provided with *NR-DC-PC-mode = Semi-static-mode1*,

$$P_{\text{Total}}^{\text{NR-DC}} = \text{MIN}\{P_{\text{EMAX,NR-DC}}, P_{\text{PowerClass,NR-DC}}\} + 0.3 \text{ dB}$$

with  $P_{\text{PowerClass,NR-DC}}$  set to power class 3 in case the UE indicates a higher power class in any CG. The UE determines the maximum transmission power for the MCG and the SCG using the respective configured maximum power  $P_{\text{CMAX},f,c,\text{MCG}}$  and  $P_{\text{CMAX},f,c,\text{SCG}}$ .

If for synchronous NR-DC operation a UE is provided *NR-DC-PC-mode = Semi-static-mode2*, the  $P_{Total}^{NR-DC}$  is determined as above and

- if at least one symbol of slot  $i_1$  of the MCG/SCG is indicated as uplink or flexible to a UE by *tdd-UL-DL-ConfigurationCommon* and *tdd-UL-DL-ConfigurationDedicated*, if provided, overlaps with a symbol for any ongoing transmission overlapping with slot  $i_2$  of the SCG/MCG, the UE determines a maximum power for the transmission on the SCG/MCG overlapping with slot  $i_2$  using the configured maximum power  $P_{CMAX,f,c,SCG}$  or  $P_{CMAX,f,c,MCG}$  for the SCG or MCG, respectively,
- otherwise (i.e. an ongoing transmission overlapping with slot  $i_2$  of the SCG/MCG overlaps with only semi-static downlink symbols within slot  $i_1$  of the MCG/SCG), the UE determines a maximum power for the transmission on MCG or the SCG overlapping with slot  $i_2$  using the configured maximum power as specified in clause 6.2.4.

If a UE indicates a capability for dynamic power sharing between the MCG and the SCG and is provided with *NR-DC-PC-mode = Dynamic*,

$$P_{Total}^{NR-DC} = \text{MIN}\{P_{EMAX, NR-DC}, P_{PowerClass, NR-DC}\}$$

with  $P_{PowerClass, NR-DC}$  set to power class 3 in case the UE indicates a higher power class in any CG. The UE determines the maximum transmission power for the MCG and the SCG using the respective configured maximum power  $P_{CMAX,f,c,MCG}$  and  $P_{CMAX,f,c,SCG}$  except

- if UE transmission(s) in slot  $i_1$  of the MCG or in slot  $i_2$  of the SCG do not overlap in time with any UE transmission(s) on the SCG or the MCG, respectively, the UE determines a maximum transmission power in slot  $i_1$  of the MCG or in slot  $i_2$  of the SCG using the configured maximum power as specified in clause 6.2.4.

If a UE indicates a capability to determine a total transmission power on the SCG at a first symbol of a transmission occasion on the SCG by determining transmissions on the MCG as specified in clause 7.6.2 of [8], and is provided with *NR-DC-PC-mode = Dynamic*,

$$P_{Total}^{NR-DC} = \text{MIN}\{P_{EMAX, NR-DC}, P_{PowerClass, NR-DC}\}$$

with  $P_{PowerClass, NR-DC}$  set to power class 3 in case the UE indicates a higher power class in any CG. The UE determines the maximum transmission power for the MCG and the SCG using the respective configured maximum power  $P_{CMAX,f,c,MCG}$  and  $P_{CMAX,f,c,SCG}$ .

The measured total maximum output power  $P_{UMAX}$  over both CGs measured over the transmission reference time duration is

$$P_{UMAX} = 10 \log_{10} (p_{UMAX,c,MCG} + p_{UMAX,c,SCG}),$$

where  $p_{UMAX,c,MCG}$  and  $p_{UMAX,c,SCG}$  denote the measured output power of serving cells  $c$  contained in the respective MCG and SCG expressed in linear scale.

The measured total configured maximum output power  $P_{UMAX}$  shall be within the following bounds:

$$P_{CMAX\_L} - T_{LOW}(P_{CMAX\_L}) \leq P_{UMAX} \leq P_{CMAX\_H} + T_{HIGH}(P_{CMAX\_H})$$

with the tolerances  $T_{LOW}(P_{CMAX\_H})$  and  $T_{HIGH}(P_{CMAX\_H})$  for applicable values of  $P_{CMAX}$  specified in Table 6.2B.4.1.3-2.

When a subframe  $p$  on the MCG overlap with a physical-channel  $q$  on the SCG, then for  $P_{UMAX}$  evaluation, the subframe  $p$  on the MCG is taken as reference period  $T_{REF}$  and always considered as the reference measurement duration and the following rules are applicable.

$T_{REF}$  and  $T_{eval}$  are specified in Table 6.2B.4.1.3-1 when same or different subframe and physical-channel durations are used on the carriers. The  $P_{PowerClass}$  shall not be exceeded by the UE during any evaluation period of time.

**Table 6.2B.4.1.3-1:  $P_{CMAX}$  evaluation window**

| Transmission duration                                    | $T_{REF}$    | $T_{eval}$                                                    |
|----------------------------------------------------------|--------------|---------------------------------------------------------------|
| Different transmission duration in different CG carriers | MCG subframe | $\text{MIN}(T_{no\_hopping}, \text{Physical Channel Length})$ |

For each  $T_{REF}$ , the  $P_{CMAX\_H}$  is evaluated per  $T_{eval}$  and given by the maximum value over the transmission(s) within the  $T_{eval}$  as follows:

$$P_{CMAX\_H} = \text{MAX}\{P_{CMAX\_NR-DC\_H}(p,q), P_{CMAX\_NR-DC\_H}(p,q+1), \dots, P_{CMAX\_NR-DC\_H}(p,q+n)\}$$

where  $P_{CMAX\_NR-DC\_H}$  entries are the applicable upper limits for each overlapping scheduling unit pairs  $(p,q)$ ,  $(p, q+1)$ , up to  $(p, q+n)$  for each applicable  $T_{eval}$  duration, where  $q+n$  is the last physical-channel on the SCG overlapping with subframe  $p$  on the MCG, while  $P_{CMAX\_L}$  is computed as follows:

$$P_{CMAX\_L} = \text{MIN}\{P_{CMAX\_NR-DC\_L}(p,q), P_{CMAX\_NR-DC\_L}(p,q+1), \dots, P_{CMAX\_NR-DC\_L}(p,q+n)\}$$

where  $P_{CMAX\_NR-DC\_L}$  entries are the applicable lower limits for each overlapping scheduling unit pairs  $(p,q)$ ,  $(p, q+1)$  up to  $(p, q+n)$  for each applicable  $T_{eval}$  duration, where  $q+n$  is the last physical-channel on the SCG overlapping with subframe  $p$  on the MCG.

For a UE provided with  $NR-DC-PC-mode = \text{Semi-static-mode1}$  and configured with  $p_{NR,MCG} + p_{NR,SCG} \leq \hat{P}_{Total}^{NR-DC}$  with  $p_{NR,MCG}$  and  $p_{NR,SCG}$  the values of the  $P_{NR}$  for the respective MCG and SCG expressed in linear scale

$$P_{CMAX\_NR-DC\_L}(p,q) = 10 \log_{10} [p_{CMAX\_L, MCG}(p) + p_{CMAX\_L, SCG}(q)]$$

$$P_{CMAX\_NR-DC\_H}(p,q) = 10 \log_{10} [p_{CMAX\_H, MCG}(p) + p_{CMAX\_H, SCG}(q)]$$

where

$p_{CMAX\_L, MCG}$ ,  $p_{CMAX\_L, SCG}$ ,  $p_{CMAX\_H, MCG}$ ,  $p_{CMAX\_H, SCG}$  can be  $p_{CMAX\_L,f,c,MCG}$ ,  $p_{CMAX\_H,f,c,MCG}$ ,  $p_{CMAX\_L,f,c,SCG}$ , and  $p_{CMAX\_H,f,c,SCG}$  the values of the respective  $P_{CMAX\_L,f,c,MCG}$ ,  $P_{CMAX\_H,f,c,MCG}$ ,  $P_{CMAX\_L,f,c,SCG}$ , and  $P_{CMAX\_H,f,c,SCG}$  expressed in linear scale, or  $p_{CMAX\_L,CA,MCG}$ ,  $p_{CMAX\_H,CA,MCG}$ ,  $p_{CMAX\_L,CA,SCG}$ , and  $p_{CMAX\_H,CA,SCG}$  the values of the respective  $P_{CMAX\_L,CA,MCG}$ ,  $P_{CMAX\_H,CA,MCG}$ ,  $P_{CMAX\_L,CA,SCG}$ , and  $P_{CMAX\_H,CA,SCG}$  expressed in linear scale if the contiguous carrier aggregation is configured in MCG and/or SCG or a combinations of single cell and carrier aggregation while the measured configured maximum power  $P_{UMAX}$  for each CG shall meet the requirements as specified in clause 6.2.4 but with bounds for  $P_{CMAX,f,c,MCG}(p)$  and  $P_{CMAX,f,c,SCG}$  as specified in this clause or 6.2A.4.1.1 as modified in this clause for contiguous carrier aggregation configured cell group.

If for synchronized NR-DC a UE is provided with  $NR-DC-PC-mode = \text{Semi-static-mode2}$  and configured with  $p_{NR,MCG} + p_{NR,SCG} \leq \hat{P}_{Total}^{NR-DC}$  with  $p_{NR,MCG}$  and  $p_{NR,SCG}$  the linear-scale values of the  $P_{NR}$  for the respective MCG and SCG

$$P_{CMAX\_NR-DC\_L}(p,q) = 10 \log_{10} [p_{CMAX\_L, MCG}(p) + p_{CMAX\_L, SCG}(q)]$$

$$P_{CMAX\_NR-DC\_H}(p,q) = 10 \log_{10} [p_{CMAX\_H, MCG}(p) + p_{CMAX\_H, SCG}(q)]$$

while the measured configured maximum power  $P_{UMAX}$  for each CG shall meet the requirements specified in Table 6.2.4-2 but with bounds for  $P_{CMAX,f,c,MCG}(p)$  and  $P_{CMAX,f,c,SCG}(q)$  as specified in this clause or 6.2A.4.1.1-1 when intra-band carrier aggregation contiguous is configured in the MCG and/or SCG with the bounds  $P_{CMAX,CA,MCG}(p)$  and  $P_{CMAX,CA,SCG}$  defined in this clause except

- if an ongoing transmission overlapping with physical channel  $q$  of the SCG or subframe  $p$  of the MCG overlaps with only semi-static downlink symbols within the respective subframe  $p$  of the MCG or physical channel  $q$  of the SCG as indicated to a UE by *tdd-UL-DL-ConfigurationCommon* and *tdd-UL-DL-ConfigurationDedicated*, if provided,

then the measured configured maximum power  $P_{UMAX}$  for the transmission subframe  $p$  on the MCG or physical channel  $q$  on the SCG shall meet the requirements as specified in clause 6.2.4 and with bounds for  $P_{CMAX,f,c,MCG}(p)$  or  $P_{CMAX,f,c,SCG}$  as specified in this clause or Table 6.2A.4.1.1-1 when intra-band carrier aggregation contiguous is configured in the MCG and/or SCG with bounds for  $P_{CMAX,CA,MCG}(p)$  and  $P_{CMAX,CA,SCG}$  defined in this clause For a UE provided with  $NR-DC-PC-mode = \text{Dynamic}$ ,

$$P_{CMAX\_NR-DC\_L}(p,q) = \text{MIN}\{10 \log_{10} [p_{CMAX\_L, MCG}(p) + p_{CMAX\_L, SCG}(q)], P_{Total}^{NR-DC}\}$$

$$P_{CMAX\_NR-DC\_H}(p,q) = \text{MIN}\{10 \log_{10} [p_{CMAX\_H, MCG}(p) + p_{CMAX\_H, SCG}(q)], P_{Total}^{NR-DC}\}$$

while the measured configured maximum power  $P_{UMAX}$  on the MCG shall meet the requirements as specified in clause 6.2.4-2 but with bounds for  $P_{CMAX,f,c,MCG}(p)$  as specified in this clause, or as specified in Table 6.2A.4.1.1-1 when intra-band carrier aggregation contiguous is configured in the MCG with the bounds for  $P_{CMAX,CA,MCG}(p)$  as specified in this clause and the  $P_{UMAX}$  on the SCG shall be within

$$P_{\text{CMAX\_L}} - \text{MAX}\{T_{\text{L,c}}, T(P_{\text{CMAX\_L}})\} \leq P_{\text{UMAX}} \leq P_{\text{CMAX\_H}} + T(P_{\text{CMAX\_H,f,c}})$$

where for single uplink cell SCG

$$P_{\text{CMAX\_L}} = \text{MIN}\{P_{\text{CMAX\_L,f,c,SCG}}(p), 10 \log_{10}(\hat{P}_{\text{Total}}^{\text{NR-DC}} - p_{\text{NR,MSG}})\}$$

$$P_{\text{CMAX\_H}} = \text{MIN}\{P_{\text{CMAX\_H,f,c,SCG}}(p), 10 \log_{10}(\hat{P}_{\text{Total}}^{\text{NR-DC}} - p_{\text{NR,MSG}})\}$$

and for intra-band carrier aggregation configured SCG

$$P_{\text{CMAX\_L}} = \text{MIN}\{P_{\text{CMAX\_L,CA,SCG}}(p), 10 \log_{10}(\hat{P}_{\text{Total}}^{\text{NR-DC}} - p_{\text{NR,MSG}})\}$$

$$P_{\text{CMAX\_H}} = \text{MIN}\{P_{\text{CMAX\_H,CA,SCG}}(p), 10 \log_{10}(\hat{P}_{\text{Total}}^{\text{NR-DC}} - p_{\text{NR,MSG}})\}$$

where  $P_{\text{CMAX\_L,CA,SCG}}$  and  $P_{\text{CMAX\_H,CA,SCG}}$  bounds are defined in this clause,

with limits as specified in Table 6.2.4-2 or as specified in Table 6.2A.4.1.1-1 when intra-band carrier aggregation contiguous is configured in the MCG and  $p_{\text{NR,MCG}}$  the value of the  $P_{\text{NR}}$  for the MCG expressed in linear scale.

**Table 6.2B.4.1.3-2:  $P_{\text{CMAX}}$  tolerance for NR-DC**

| $P_{\text{CMAX}}(\text{dBm})$                                                                                                                                                                                                 | Tolerance<br>$T_{\text{LOW}}(P_{\text{CMAX\_L}}) \text{ (dB)}$ | Tolerance<br>$T_{\text{HIGH}}(P_{\text{CMAX\_H}}) \text{ (dB)}$ |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|-----------------------------------------------------------------|
| $23 \leq P_{\text{CMAX}} \leq 33$                                                                                                                                                                                             | 3.0                                                            | 2.0                                                             |
| $22 \leq P_{\text{CMAX}} < 23$                                                                                                                                                                                                | 5.0                                                            | 2.0                                                             |
| $21 \leq P_{\text{CMAX}} < 22$                                                                                                                                                                                                | 5.0                                                            | 3.0                                                             |
| $20 \leq P_{\text{CMAX}} < 21$                                                                                                                                                                                                | 5.0                                                            | 4.0                                                             |
| $16 \leq P_{\text{CMAX}} < 20$                                                                                                                                                                                                | 5.0                                                            |                                                                 |
| $11 \leq P_{\text{CMAX}} < 16$                                                                                                                                                                                                | 6.0                                                            |                                                                 |
| $-40 \leq P_{\text{CMAX}} < 11$                                                                                                                                                                                               | 7.0                                                            |                                                                 |
| NOTE 1: For UEs provided with <i>NR-DC-PC-mode</i> = <i>Semi-static-mode1</i> or with <i>NR-DC-PC-mode</i> = <i>Semi-static-mode2</i> , the upper tolerance $T_{\text{high}}$ shall be reduced by 0.3 dB for $P \geq 20$ dBm. |                                                                |                                                                 |

## 6.2B.4.2 $\Delta T_{\text{IB,c}}$ for NR-DC

For inter-band NR-DC with one uplink carrier assigned per NR band, the  $\Delta T_{\text{IB,c}}$  for the corresponding inter-band CA configuration as specified in clause 6.2A.4.2 applies.

## 6.2C Transmitter power for SUL

### 6.2C.1 Configured transmitted power for SUL

When a UE is configured with both NR UL and NR SUL carriers in a serving cell with active transmission either on the UL carrier(s) or SUL carrier, the configured transmit power requirements specified in clause 6.2.4 and 6.2A.4 are applicable for the UL carrier(s) and the SUL carrier, respectively.

If a UE supports a different power class than the default UE power class for NR UL band of SUL combination and the supported power class enables the higher maximum output power for SUL combination than that of the default power class:

- if the field of UE capability *maxUplinkDutyCycle-SULcombination-PC2* is not absent and the average percentage of uplink symbols transmitted in a certain evaluation period is larger than the maximum percentage of uplink symbols that the UE indicates by *maxUplinkDutyCycle-SULcombination-PC2* as defined in TS 38.331 (The exact evaluation period is no less than one radio frame); or
- if the IE P-Max as defined in TS 38.331 [7] is provided and set to the maximum output power of the default power class or lower;
- shall apply all requirements for the default power class to the supported power class and set the configured transmitted power as specified in clause 6.2.4;

- else;
- shall apply all requirements for the supported power class and set the configured transmitted power as specified in clause 6.2.4 (regardless of the average percentage of uplink symbols if the field of UE capability *maxUplinkDutyCycle-interBandCA-PC2* is absent).

The average percentage of uplink symbols is defined as  $50\% \times (\text{Duty}_{\text{NR},x} / \text{maxDuty}_{\text{NR},x} + \text{Duty}_{\text{NR},y} / \text{maxDuty}_{\text{NR},y})$ .  $\text{Duty}_{\text{NR},x}$ ,  $\text{Duty}_{\text{NR},y}$  represent the actual percentage of uplink symbols transmitted in the same evaluation period (The exact evaluation period is no less than one radio frame) for NR Band x, NR Band y respectively  $\text{maxDuty}_{\text{NR},x}$ ,  $\text{maxDuty}_{\text{NR},y}$  represent the field of UE capability *maxUplinkDutyCycle-PC2-FR1* per band as defined in TS 38.331. For NR Band x or NR Band y,

- if power class of one or both of the bands within the band combination is power class 2 and the corresponding UE capability *maxUplinkDutyCycle-PC2-FR1* is absent;
- the corresponding  $\text{maxDuty}_{\text{NR},x}$  or  $\text{maxDuty}_{\text{NR},y}$  is equal to 50%;
- else if the band is configured with power class 3;
- the corresponding  $\text{maxDuty}_{\text{NR},x}$  or  $\text{maxDuty}_{\text{NR},y}$  is equal to 100%.

## 6.2C.2 $\Delta T_{\text{IB},c}$

For the UE which supports SUL band combination,  $\Delta T_{\text{IB},c}$  in Tables below applies. Unless otherwise stated,  $\Delta T_{\text{IB},c}$  is set to zero.

**Table 6.2C.2-1:  $\Delta T_{\text{IB},c}$  due to SUL**

| Band combination for SUL | NR Band | $\Delta T_{\text{IB},c}$ (dB) |
|--------------------------|---------|-------------------------------|
| SUL_n41-n80              | n41     | 0.3 <sup>1</sup>              |
|                          |         | 0.8 <sup>2</sup>              |
|                          | n80     | 0.5                           |
| SUL_n41-n81              | n41     | 0.3                           |
|                          | n81     | 0.3                           |
| SUL_n41-n83              | n41     | 0.3                           |
|                          | n83     | 0.3                           |
| SUL_n41-n97              | n41     | 0.5                           |
|                          | n97     | 0.5                           |
| SUL_n41-n98              | n41     | 0.5                           |
|                          | n98     | 0.5                           |
| SUL_n41-n99              | n41     | 0.4 <sup>1</sup>              |
|                          |         | 0.9 <sup>2</sup>              |
|                          | n99     | 0.3                           |
| SUL_n48-n99              | n48     | 0.6                           |
|                          | n99     | 0.8                           |
| SUL_n77-n80              | n77     | 0.8                           |
|                          | n80     | 0.6                           |
| SUL_n77-n84              | n77     | 0.8                           |
|                          | n84     | 0.6                           |
| SUL_n77-n99              | n77     | 0.6                           |
|                          | n99     | 0.8                           |
| SUL_n78-n80              | n78     | 0.8                           |
|                          | n80     | 0.6                           |
| SUL_n78-n81              | n78     | 0.8                           |
|                          | n81     | 0.6                           |
|                          | n82     | 0.6                           |
| SUL_n78-n82              | n78     | 0.8                           |
|                          | n82     | 0.6                           |
| SUL_n78-n83              | n78     | 0.8                           |
|                          | n83     | 0.5                           |
| SUL_n78-n84              | n78     | 0.8                           |
|                          | n84     | 0.3                           |
| SUL_n78-n86              | n78     | 0.8                           |

|                                                                                                   |     |     |
|---------------------------------------------------------------------------------------------------|-----|-----|
|                                                                                                   | n86 | 0.6 |
| SUL_n79-n83                                                                                       | n79 | 0.8 |
|                                                                                                   | n83 | 0.5 |
| SUL_n79-n97                                                                                       | n79 | 0.8 |
|                                                                                                   | n98 | 0.3 |
| SUL_n79-n98                                                                                       | n79 | 0.8 |
|                                                                                                   | n98 | 0.3 |
| NOTE 1: The requirement is applied for UE transmitting on the frequency range of 2515 – 2690 MHz. |     |     |
| NOTE 2: The requirement is applied for UE transmitting on the frequency range of 2496 - 2515 MHz. |     |     |

**Table 6.2C.2-2:  $\Delta T_{IB,c}$  for SUL band combination (Three bands)**

| Band combination for SUL                                                                        | NR Band | $\Delta T_{IB,c}$ (dB) |
|-------------------------------------------------------------------------------------------------|---------|------------------------|
| CA_n1_n78-n80                                                                                   | n1      | 0.6                    |
|                                                                                                 | n78     | 0.8                    |
|                                                                                                 | n80     | 0.6                    |
| CA_n1_n78-n84                                                                                   | n1      | 0.6                    |
|                                                                                                 | n78     | 0.8                    |
|                                                                                                 | n84     | 0.6                    |
| CA_n3_n41-n80                                                                                   | n3      | 0.5                    |
|                                                                                                 | n41     | 0.3 <sup>1</sup>       |
|                                                                                                 |         | 0.8 <sup>2</sup>       |
|                                                                                                 | n80     | 0.5                    |
| CA_n3_n78-n80                                                                                   | n3      | 0.6                    |
|                                                                                                 | n78     | 0.8                    |
|                                                                                                 | n80     | 0.6                    |
| CA_n3_n79-n80                                                                                   | n3      | 0.3                    |
|                                                                                                 | n79     | 0.8                    |
|                                                                                                 | n80     | 0.3                    |
| CA_n28_n41-n83                                                                                  | n28     | 0.3                    |
|                                                                                                 | n41     | 0.3                    |
|                                                                                                 | n83     | 0.3                    |
| CA_n28_n79-n83                                                                                  | n28     | 0.5                    |
|                                                                                                 | n79     | 0.8                    |
|                                                                                                 | n83     | 0.5                    |
| CA_n41_n79-n80                                                                                  | n41     | 0.3 <sup>1</sup>       |
|                                                                                                 |         | 0.8 <sup>2</sup>       |
|                                                                                                 | n79     | 0.8                    |
|                                                                                                 | n80     | 0.3                    |
| CA_n41_n79-n83                                                                                  | n41     | 0.3                    |
|                                                                                                 | n79     | 0.8                    |
|                                                                                                 | n83     | 0.5                    |
| CA_n41_n79-n97                                                                                  | n41     | 0.5                    |
|                                                                                                 | n79     | 0.5                    |
|                                                                                                 | n97     | 0.5                    |
| CA_n79_n41-n80                                                                                  | n41     | 0.3 <sup>1</sup>       |
|                                                                                                 |         | 0.8 <sup>2</sup>       |
|                                                                                                 | n79     | 0.8                    |
| CA_n79_n41-n83                                                                                  | n80     | 0.3                    |
|                                                                                                 | n41     | 0.3                    |
|                                                                                                 | n79     | 0.8                    |
| CA_n79_n41-n83                                                                                  | n83     | 0.5                    |
|                                                                                                 | n41     | 0.5                    |
|                                                                                                 | n79     | 0.5                    |
| CA_n79_n41-n97                                                                                  | n97     | 0.5                    |
|                                                                                                 | n41     | 0.5                    |
|                                                                                                 | n79     | 0.5                    |
| NOTE 1: The requirement is applied for UE transmitting on the frequency range of 2515-2690 MHz. |         |                        |
| NOTE 2: The requirement is applied for UE transmitting on the frequency range of 2496-2515 MHz. |         |                        |

**Table 6.2C.2-3:  $\Delta T_{IB,c}$  for SUL band combination (Four bands)**

| Band combination for SUL | NR Band | $\Delta T_{IB,c}$ (dB) |
|--------------------------|---------|------------------------|
| CA_n28-n79_n41-n83       | n28     | 0.3                    |
|                          | n41     | 0.3                    |
|                          | n79     | 0.5                    |
|                          | n83     | 0.3                    |
| CA_n28-n41_n79-n83       | n28     | 0.3                    |
|                          | n41     | 0.3                    |
|                          | n79     | 0.5                    |
|                          | n83     | 0.3                    |

## 6.2D Transmitter power for UL MIMO

### 6.2D.1 UE maximum output power for UL MIMO

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the maximum output power for any transmission bandwidth within the channel bandwidth is specified in Table 6.2D.1-1. The requirements shall be met with the UL MIMO configurations specified in Table 6.2D.1-2. For UE supporting UL MIMO, the maximum output power is defined as the sum of the maximum output power from both UE antenna connectors. The period of measurement shall be at least one sub frame (1 ms).

The requirements shall be met with the UL MIMO configurations of using 2-layer UL MIMO codebook-based

transmission with precoding matrix of  $W = \frac{1}{\sqrt{2}} \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ . DCI Format for UE configured in PUSCH transmission mode

for uplink single-user MIMO shall be used.

**Table 6.2D.1-1: UE Power Class for UL MIMO in closed loop spatial multiplexing scheme**

| NR band | Class 1.5 (dBm) | Tolerance (dB)     | Class 2 (dBm) | Tolerance (dB)     | Class 3 (dBm) | Tolerance (dB)     | Class 5 (dBm) | Tolerance (dB) |
|---------|-----------------|--------------------|---------------|--------------------|---------------|--------------------|---------------|----------------|
| n1      |                 |                    |               |                    | 23            | +2/-3              |               |                |
| n2      |                 |                    |               |                    | 23            | +2/-3 <sup>1</sup> |               |                |
| n3      |                 |                    |               |                    | 23            | +2/-3 <sup>1</sup> |               |                |
| n7      |                 |                    |               |                    | 23            | +2/-3 <sup>1</sup> |               |                |
| n24     |                 |                    |               |                    | 23            | +2/-4 <sup>1</sup> |               |                |
| n25     |                 |                    |               |                    | 23            | +2/-3 <sup>1</sup> |               |                |
| n30     |                 |                    |               |                    | 23            | +2/-3              |               |                |
| n34     |                 |                    | 26            | +2/-3              | 23            | +2/-3              |               |                |
| n38     |                 |                    |               |                    | 23            | +2/-3              |               |                |
| n39     |                 |                    | 26            | +2/-3              | 23            | +2/-3              |               |                |
| n40     |                 |                    | 26            | +2/-3 <sup>1</sup> | 23            | +2/-3              |               |                |
| n41     | 29              | +2/-3 <sup>1</sup> | 26            | +2/-3 <sup>1</sup> | 23            | +2/-3 <sup>1</sup> |               |                |
| n48     |                 |                    |               |                    | 23            | +2/-3              |               |                |
| n66     |                 |                    |               |                    | 23            | +2/-3              |               |                |
| n70     |                 |                    |               |                    | 23            | +2/-3              |               |                |
| n71     |                 |                    |               |                    | 23            | +2/-3              |               |                |
| n77     | 29              | +2/-3              | 26            | +2/-3              | 23            | +2/-3              |               |                |
| n78     | 29              | +2/-3              | 26            | +2/-3              | 23            | +2/-3              |               |                |
| n79     | 29              | +2/-3              | 26            | +2/-3              | 23            | +2/-3              |               |                |
| n80     |                 |                    |               |                    | 23            | +2/-3 <sup>1</sup> |               |                |
| n84     |                 |                    |               |                    | 23            | +2/-3              |               |                |
| n95     |                 |                    | 26            | +2/-3              | 23            | +2/-3              |               |                |
| n97     |                 |                    | 26            | +2/-3              | 23            | +2/-3              |               |                |
| n98     |                 |                    | 26            | +2/-3              | 23            | +2/-3              |               |                |
| n99     |                 |                    |               |                    | 23            | +2/-4 <sup>1</sup> |               |                |

NOTE 1: The transmission bandwidths confined within  $F_{UL\_low}$  and  $F_{UL\_low} + 4$  MHz or  $F_{UL\_high} - 4$  MHz and  $F_{UL\_high}$ , the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB

NOTE 2: Power class 3 is the default power class unless otherwise stated

**Table 6.2D.1-2: UL MIMO configuration in closed-loop spatial multiplexing scheme**

| Transmission scheme                                                                                  | DCI format     | Number of layers | TPMI index |
|------------------------------------------------------------------------------------------------------|----------------|------------------|------------|
| Codebook based uplink                                                                                | DCI format 0_1 | 2                | 0          |
| NOTE 1: The UE is configured with one SRS resource with the parameter <i>nrofSRS-Ports</i> set to 2. |                |                  |            |

For UE support uplink full power transmission (ULFPTx) for UL MIMO, the maximum output power requirements specified in Table 6.2D.1-1 shall be met with the PUSCH configurations specified in Table 6.2D.1-3, based upon UE's support of uplink full power transmission mode. For UE supporting uplink full power transmission (ULFPTx) for UL MIMO, the maximum output power is defined as the sum of the maximum output power from both UE antenna connectors. The period of measurement shall be at least one sub frame (1 ms).

**Table 6.2D.1-3: PUSCH Configuration for uplink full power transmission (ULFPTx)**

| ULFPTx Mode                                                                                                                                                                                                                                                                       | Transmission scheme   | DCI format     | Modulation                           | Number of layers | Number of Tx Port | TPMI index              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|----------------|--------------------------------------|------------------|-------------------|-------------------------|
| Mode-1                                                                                                                                                                                                                                                                            | Codebook based uplink | DCI format 0_1 | DFT-s-OFDM, CP-OFDM <sup>NOTE3</sup> | 1                | 2                 | 2                       |
| Mode-2                                                                                                                                                                                                                                                                            | Codebook based uplink | DCI format 0_1 | DFT-s-OFDM, CP-OFDM                  | 1                | 2                 | 0 or 1 <sup>NOTE2</sup> |
| Mode-full power                                                                                                                                                                                                                                                                   | Codebook based uplink | DCI format 0_1 | DFT-s-OFDM, CP-OFDM                  | 1                | 2                 | 0,1                     |
| NOTE 1: The UE is configured with one SRS resource with the parameter <i>nrofSRS-Ports</i> set to 2.                                                                                                                                                                              |                       |                |                                      |                  |                   |                         |
| NOTE 2: TPMI index selected shall be based upon the full power TPMI reported by the UE [8, TS 38.213].                                                                                                                                                                            |                       |                |                                      |                  |                   |                         |
| NOTE 3: For PUSCH configured with <i>ul-FullPowerTransmission</i> set to <i>fullpowerMode1</i> , all the transmitter requirement for CP-OFDM based modulation does not need to be verified if the requirements for 2-layer UL MIMO according to Table 6.2D.1-2 has been verified. |                       |                |                                      |                  |                   |                         |

If the UE is scheduled for single antenna-port PUSCH transmission by DCI format 0\_0 or by DCI format 0\_1 codebook based transmission with precoding matrix  $W=1$  [6.3.1.5 TS 38.211], the requirements in clause 6.2 apply for at least one antenna connector for the power class as indicated by the *ue-PowerClass* field in capability signalling with the following exception: for UEs indicating *txDiversity-r16*, the requirements in clause 6.2G for the power class indicated by the *ue-PowerClass*.

A UE indicating the feature *ul-FullPwrMode-r16* or *ul-FullPwrMode2-TPMIGroup-r16* for a band shall meet the requirement in clause 6.2 for at least one antenna connector when scheduled for single antenna-port transmission by DCI format 0\_0 or by DCI format 0\_1 for codebook-based transmission with precoding matrix  $W=1$  [6.3.1.5 TS 38.211].

## 6.2D.2 UE maximum output power reduction for UL MIMO

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2D.1-1 is specified in Table 6.2.2-1 for PC3, Table 6.2D.2-1 for 2Tx PC2 when the UE does not indicate *ul-FullPwrMode-r16* or *ul-FullPwrMode2-TPMIGroup-r16* for the band and Table 6.2.2-2 for 2Tx PC2 when the UE indicates *ul-FullPwrMode-r16* or *ul-FullPwrMode2-TPMIGroup-r16* for the band, Table 6.2D.2-2 and Table 6.2D.2-3 for PC1.5 respectively. For UE power class 1.5, the allowed maximum power reduction (MPR) defined in Table 6.2D.2-3 is in accordance with the indicated *modifiedMPR-Behavior* specified in Table L.1-1 for channel bandwidths  $\leq 100$  MHz. The requirements shall be met with UL MIMO configurations defined in Table 6.2D.1-2. For UE supporting UL MIMO, the maximum output power is defined as the sum of the maximum output power from both UE antenna connectors.

For UE support uplink full power transmission (ULFPTx) for UL MIMO except the feature *ul-FullPwrMode-r16* or *ul-FullPwrMode2-TPMIGroup-r16*, the allowed MPR for the maximum output power in Table 6.2D.1-1 is specified in Table 6.2.2-1 for PC3, Table 6.2D.2-1 when *TxD* is indicated and Table 6.2.2-2 when *TxD* is not indicated for PC2, Table 6.2D.2-2 and Table 6.2D.2-3 for PC1.5 respectively, and the requirements shall be met with the PUSCH configurations specified in Table 6.2D.1-3, based upon UE's support of uplink full power transmission mode. A UE indicating the feature *ul-FullPwrMode-r16* or *ul-FullPwrMode2-TPMIGroup-r16* for a band shall meet the maximum output power requirement with MPR according to clause 6.2.2. When a UE that indicates PC1.5 for a given band is limited to PC2 by the rules in clause 6.2.1, the MPR requirements in Table 6.2.2-2 apply. For UE support uplink full



power transmission (ULPFTx) for UL MIMO, the maximum output power is defined as the sum of the maximum output power from both UE antenna connectors.

The same MPR requirements shall be applicable to UE with 1-layer UL MIMO transmission (either with or without

ULPFTx) as with the UL MIMO configurations of using 2-layer UL MIMO transmission with codebook of  $\frac{1}{\sqrt{2}} \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ .

For the UE maximum output power modified by MPR, the power limits specified in clause 6.2D.4 apply.

If UE is scheduled for single antenna-port PUSCH transmission by DCI format 0\_0 or by DCI format 0\_1 for single antenna port codebook based transmission, the corresponding requirements in clause 6.2D.1 apply for the power class as indicated by the *ue-PowerClass* field in capability signaling. A UE indicating the feature *ul-FullPwrMode-r16* or *ul-FullPwrMode2-TPMIGroup-r16* for a band shall meet the requirement in clause 6.2 with MPR according to clause 6.2.2 for at least one antenna connector when scheduled for single antenna-port transmission by DCI format 0\_0 or by DCI format 0\_1 for codebook-based transmission on a single antenna port with precoding matrix  $W=1$  [6.3.1.5 TS 38.211].

Unless otherwise specified, ‘pi/2 BPSK’ refers to both variants of pi/2 BPSK referenced in table 6.2.2-1.

**Table 6.2D.2-1 Maximum power reduction (MPR) for power class 2 with 2Tx**

| Modulation |           | MPR (dB)            |                      |                      |
|------------|-----------|---------------------|----------------------|----------------------|
|            |           | Edge RB allocations | Outer RB allocations | Inner RB allocations |
| DFT-s-OFDM | Pi/2 BPSK | ≤ 3.5               | ≤ 1                  | 0                    |
|            | QPSK      | ≤ 3.5               | ≤ 2                  | 0.5                  |
|            | 16 QAM    | ≤ 3.5               | ≤ 2.5                | ≤ 1.5                |
|            | 64 QAM    | ≤ 3.5               | ≤ 3                  |                      |
|            | 256 QAM   | ≤ 5.5               |                      |                      |
| CP-OFDM    | QPSK      | ≤ 4.0               | ≤ 3.5                | ≤ 2                  |
|            | 16 QAM    | ≤ 4.0               | ≤ 3.5                | ≤ 2.5                |
|            | 64 QAM    | ≤ 4.5               |                      |                      |
|            | 256 QAM   | ≤ 8.0               |                      |                      |

**Table 6.2D.2-2 Maximum power reduction (MPR) for power class 1.5 with 2Tx**

| Modulation |           | MPR (dB)            |                      |                      |
|------------|-----------|---------------------|----------------------|----------------------|
|            |           | Edge RB allocations | Outer RB allocations | Inner RB allocations |
| DFT-s-OFDM | Pi/2 BPSK | $\leq 6$            | $\leq [2]$           | $\leq 0.5$           |
|            | QPSK      | $\leq 6.5$          | $\leq [2.5]$         | $\leq 0.5$           |
|            | 16 QAM    | $\leq 6.5$          | $\leq [3.5]$         | $\leq 1.5$           |
|            | 64 QAM    | $\leq 6.5$          | $\leq [4]$           | $\leq 3.5$           |
|            | 256 QAM   | $\leq 6.5$          | $\leq 6.5$           | $\leq [6.5]$         |
| CP-OFDM    | QPSK      | $\leq 6.5$          | $\leq [4.5]$         | $\leq 2$             |
|            | 16 QAM    | $\leq 6.5$          | $\leq [4.5]$         | $\leq 2.5$           |
|            | 64 QAM    | $\leq 6.5$          | $\leq [5]$           | $\leq 4.5$           |
|            | 256 QAM   | $\leq 8.5$          | $\leq 8.5$           | $\leq [8.5]$         |

**Table 6.2D.2-3 Maximum power reduction (MPR) for power class 1.5 with 2Tx**

| Modulation |           | MPR (dB)            |                      |                      |
|------------|-----------|---------------------|----------------------|----------------------|
|            |           | Edge RB allocations | Outer RB allocations | Inner RB allocations |
| DFT-s-OFDM | Pi/2 BPSK | $\leq 6$            | $\leq 1.5$           | $\leq 0$             |
|            | QPSK      | $\leq 6.5$          | $\leq 2$             | $\leq 0$             |
|            | 16 QAM    | $\leq 6.5$          | $\leq 3$             | $\leq 1$             |
|            | 64 QAM    | $\leq 6.5$          | $\leq 3.5$           | $\leq 3$             |
|            | 256 QAM   | $\leq 6.5$          | $\leq 5.5$           | $\leq 5.5$           |
| CP-OFDM    | QPSK      | $\leq 6.5$          | $\leq 4$             | $\leq 1.5$           |
|            | 16 QAM    | $\leq 6.5$          | $\leq 4$             | $\leq 2$             |
|            | 64 QAM    | $\leq 6.5$          | $\leq 4.5$           | $\leq 4$             |
|            | 256 QAM   | $\leq 7.5$          | $\leq 7.5$           | $\leq 7.5$           |

NOTE 1: This table is targeted to large FWA form factor with 20 dB or above antenna isolation.

Inner, outer and edge allocations are as defined in section 6.2.2 except for PC1.5 edge allocations which is for  $L_{CRB} \leq 4$  RBs instead of  $L_{CRB} \leq 2$  RBs for other power classes.

### 6.2D.3 UE additional maximum output power reduction for UL MIMO

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the A-MPR values specified in clause 6.2.3 shall apply to the maximum output power specified in Table 6.2D.1-1. The requirements shall be met with the UL MIMO configurations specified in Table 6.2D.1-2. For UE supporting UL MIMO, the maximum output power is defined as the sum of the maximum output power from both UE antenna connector. Unless stated otherwise, an A-MPR of 0 dB shall be used.

For UE support uplink full power transmission (ULFPTx) for UL MIMO, the A-MPR values specified in clause 6.2.3 shall apply to the maximum output power specified in Table 6.2D.1-1. The requirements shall be met with the PUSCH configurations specified in Table 6.2D.1-3, based upon UE's support of uplink full power transmission mode. For UE support uplink full power transmission (ULFPTx) for UL MIMO, the maximum output power is defined as the sum of the maximum output power from both UE antenna connector.

For the UE maximum output power modified by A-MPR, the power limits specified in clause 6.2D.4 apply.

If the UE is scheduled for single antenna-port PUSCH transmission by DCI format 0\_0 or by DCI format 0\_1 for single antenna port codebook-based transmission, the corresponding requirements in clause 6.2D.1 apply for the power class as indicated by the *ue-PowerClass* field in capability signaling. A UE indicating the feature *ul-FullPwrMode-r16* or *ul-FullPwrMode2-TPMIGroup-r16* for a band shall meet the requirement in clause 6.2 for at least one connector with A-MPR according to clause 6.2.3 when scheduled for single antenna-port transmission by DCI format 0\_0 or by DCI format 0\_1 for codebook-based transmission on a single antenna port with precoding matrix  $W=1$  [6.3.1.5 TS 38.211].

### 6.2D.4 Configured transmitted power for UL MIMO

For UE supporting UL MIMO, the transmitted power is configured per each UE.

The definitions of configured maximum output power  $P_{CMAX,c}$ , the lower bound  $P_{CMAX_{L,c}}$ , and the higher bound  $P_{CMAX_{H,c}}$  specified in clause 6.2.4 shall apply to UE supporting UL MIMO, where

- $P_{PowerClass}$ ,  $\Delta P_{PowerClass}$  and  $\Delta T_{C,c}$  are specified in clause 6.2.4 unless otherwise stated;
- $MPR_c$  is specified in clause 6.2D.2;
- A-MPR<sub>c</sub> is specified in clause 6.2D.3.

The measured configured maximum output power  $P_{UMAX,c}$  for serving cell  $c$  shall be within the following bounds:

$$P_{CMAX_{L,c}} - \text{MAX}\{T_L, T_{\text{LOW}}(P_{CMAX_{L,c}})\} \leq P_{UMAX,c} \leq P_{CMAX_{H,c}} + T_{\text{HIGH}}(P_{CMAX_{H,c}})$$

where  $T_{\text{LOW}}(P_{CMAX_{L,c}})$  and  $T_{\text{HIGH}}(P_{CMAX_{H,c}})$  are defined as the tolerance and applies to  $P_{CMAX_{L,c}}$  and  $P_{CMAX_{H,c}}$  separately, while  $T_L$  is the absolute value of the lower tolerance in Table 6.2D.1-1 for the applicable operating band.

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the tolerance is specified in Table 6.2D.4-1. The requirements shall be met with UL MIMO configurations specified in Table 6.2D.1-2.

For UE support uplink full power transmission (ULFPTx) for UL MIMO, the tolerance is specified in Table 6.2D.4-1. The requirements shall be met with the PUSCH configurations specified in Table 6.2D.1-3, based upon UE's support of uplink full power transmission mode.

**Table 6.2D.4-1:  $P_{CMAX,c}$  tolerance in closed-loop spatial multiplexing scheme**

| $P_{CMAX,c}$<br>(dBm)        | Tolerance<br>$T_{\text{LOW}}(P_{CMAX_{L,c}})$ (dB) | Tolerance<br>$T_{\text{HIGH}}(P_{CMAX_{H,c}})$ (dB) |
|------------------------------|----------------------------------------------------|-----------------------------------------------------|
| $23 \leq P_{CMAX,c} \leq 29$ | 3.0                                                | 2.0                                                 |
| $22 \leq P_{CMAX,c} < 23$    | 5.0                                                | 2.0                                                 |
| $21 \leq P_{CMAX,c} < 22$    | 5.0                                                | 3.0                                                 |

|                                   |     |     |
|-----------------------------------|-----|-----|
| $20 \leq P_{\text{CMAX},c} < 21$  | 5.0 | 4.0 |
| $16 \leq P_{\text{CMAX},c} < 20$  | 5.0 |     |
| $11 \leq P_{\text{CMAX},c} < 16$  | 6.0 |     |
| $-40 \leq P_{\text{CMAX},c} < 11$ | 7.0 |     |

If the UE is scheduled for single antenna-port PUSCH transmission by DCI format 0\_0 or by DCI format 0\_1 for single antenna port codebook-based transmission, the corresponding requirements in clause 6.2D.1 apply for the power class as indicated by the *ue-PowerClass* field in capability signaling.

## 6.2E Transmitter power for V2X

### 6.2E.1 UE maximum output power for V2X

#### 6.2E.1.1 General

When NR V2X UE is configured for NR V2X sidelink transmissions non-concurrent with NR uplink transmissions for NR V2X operating bands specified in Table 5.2E.1-1, the allowed NR V2X UE maximum output power is specified in Table 6.2E.1.1-0.

**Table 6.2E.1.1-0: NR V2X UE Power Class**

| NR band | Class 1 (dBm) | Tolerance (dB) | Class 2 (dBm) | Tolerance (dB) | Class 3 (dBm) | Tolerance (dB) |
|---------|---------------|----------------|---------------|----------------|---------------|----------------|
| n14     | 31            | +2/-3          |               |                | 23            | ±2             |
| n38     |               |                |               |                | 23            | ±2             |
| n47     |               |                | 26            | +2/-3          | 23            | ±2             |
| n79     |               |                |               |                | 23            | +2/-3          |

When a UE is configured for NR V2X sidelink transmissions in NR Band n47, the V2X UE shall meet the following additional requirements for transmission within the frequency ranges 5855-5925 MHz:

- The maximum mean power spectral density shall be restricted to 23 dBm/MHz EIRP when the network signaling value NS\_33 is indicated.

where the network signaling values are specified in clause 6.2E.3.

NOTE: The PSD limit in EIRP shall be converted to conducted requirement depend on the supported post antenna connector gain  $G_{\text{post connector}}$  declared by the UE following the principle described in annex I in [11].

For NR V2X UE supporting SL MIMO or Tx diversity, the maximum output power requirements in Table 6.2E.1.1-1 is defined as the sum of the maximum output power from each UE antenna connector. The period of measurement shall be at least one sub frame (1 ms).

**Table 6.2E.1.1-1: NR V2X UE Power Class for SL-MIMO**

| NR band | Class 1 (dBm) | Tolerance (dB) | Class 2 (dBm) | Tolerance (dB) | Class 3 (dBm) | Tolerance (dB) | Class 5 (dBm) | Tolerance (dB) |
|---------|---------------|----------------|---------------|----------------|---------------|----------------|---------------|----------------|
| n38     |               |                |               |                | 23            | +2/-3          |               |                |
| n47     |               |                | 26            | +2/-3          | 23            | +2/-3          |               |                |
| n79     |               |                |               |                | 23            | +2/-3          |               |                |

If the UE transmits on one antenna connector at a time, the requirements in Table 6.2E.1.1-0 shall apply to the active antenna connector.

## 6.2E.1.2 UE maximum output power for V2X concurrent operation

For the inter-band NR V2X concurrent operation, the maximum output power is specified in Table 6.2E.1.2-1 for each operating band. The period of measurement shall be at least one sub frame (1ms).

**Table 6.2E.1.2-1: Power Class for NR V2X inter-band concurrent combination (two bands)**

| NR V2X concurrent operating band Configuration | NR band | Class 1 (dBm) | Tolerance (dB) | Class 2 (dBm) | Tolerance (dB) | Class 3 (dBm) | Tolerance (dB)     | Class 5 (dBm) | Tolerance (dB) |
|------------------------------------------------|---------|---------------|----------------|---------------|----------------|---------------|--------------------|---------------|----------------|
| V2X_n1A-n47A                                   | n1      |               |                |               |                | 23            | ±2                 |               |                |
|                                                | n47     |               |                |               |                | 23            | +2/-3              |               |                |
| V2X_n5A-n47A                                   | n5      |               |                |               |                | 23            | ±2                 |               |                |
|                                                | n47     |               |                |               |                | 23            | +2/-3              |               |                |
| V2X_n8A-n47A                                   | n8      |               |                |               |                | 23            | ±2                 |               |                |
|                                                | n47     |               |                |               |                | 23            | +2/-3              |               |                |
| V2X_n39A-n47A                                  | n39     |               |                |               |                | 23            | +2/-3              |               |                |
|                                                | n47     |               |                |               |                | 23            | +2/-3              |               |                |
| V2X_n40A-n47A                                  | n40     |               |                |               |                | 23            | +2/-3              |               |                |
|                                                | n47     |               |                |               |                | 23            | +2/-3              |               |                |
| V2X_n41A-n47A                                  | n41     |               |                |               |                | 23            | +2/-3              |               |                |
|                                                | n47     |               |                |               |                | 23            | +2/-3              |               |                |
| V2X_n71A-n47A                                  | n71     |               |                |               |                | 23            | +2/-3 <sup>4</sup> |               |                |
|                                                | n47     |               |                |               |                | 23            | +2/-3              |               |                |
| V2X_n78A-n47A                                  | n78     |               |                |               |                | 23            | +2/-3              |               |                |
|                                                | n47     |               |                |               |                | 23            | +2/-3              |               |                |
| V2X_n79A-n47A                                  | n79     |               |                |               |                | 23            | +2/-3              |               |                |
|                                                | n47     |               |                |               |                | 23            | +2/-3              |               |                |

NOTE 1: For the concurrent band combinations, the simultaneous transmission and reception of sidelink and Uu interfaces can be supported while operation is agnostic of the service used on each interface.

NOTE 2:  $P_{PowerClass}$  is the maximum output power specified without taking into account the tolerance for each operating band.

NOTE 3: For inter-band concurrent operation, the aggregation power apply to the total transmitted power over all component carriers (per UE).

NOTE 4: <sup>4</sup> refers to the transmission bandwidths (Figure 5.6-1) confined within  $F_{UL\_low}$  and  $F_{UL\_low} + 4$  MHz or  $F_{UL\_high} - 4$  MHz and  $F_{UL\_high}$ , the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB

For the intra-band concurrent NR V2X operation, the maximum output power is specified in Table 6.2E.1.2-2. The period of measurement shall be at least one sub frame (1ms).

**Table 6.2E.1.2-2: NR V2X UE Power Class for intra-band concurrent combination**

| NR V2X concurrent operating band Configuration | Class 1 (dBm) | Tolerance (dB) | Class 2 (dBm) | Tolerance (dB)     | Class 3 (dBm) | Tolerance (dB)     | Class 5 (dBm) | Tolerance (dB) |
|------------------------------------------------|---------------|----------------|---------------|--------------------|---------------|--------------------|---------------|----------------|
| V2X_n79B                                       |               |                | 26            | +2/-3 <sup>2</sup> | 23            | +2/-3 <sup>2</sup> |               |                |

NOTE 1: Void.

NOTE 2:  $P_{PowerClass}$  is the maximum UE power specified without taking into account the tolerance

NOTE 3: For intra-band concurrent aggregation the maximum power requirement apply to the total transmitted power over all component carriers (per UE).

NOTE 4: Power Class 3 is the default power class unless otherwise stated.

## 6.2E.2 UE maximum output power reduction for V2X

### 6.2E.2.1 General

When UE is configured for NR V2X sidelink transmissions non-concurrent with NR uplink transmissions for NR V2X operating bands specified in Table 5.2E.1-1, this clause specifies the allowed Maximum Power Reduction (MPR) power for V2X physical channels and signals due to PSCCH/PSSCH, PSFCH and S-SSB transmission.

### 6.2E.2.2 MPR for Power class 2 and Power class 3 V2X UE

For contiguous allocation of PSCCH and PSSCH simultaneous transmission, the allowed MPR for the maximum output power for NR V2X physical channels PSCCH and PSSCH shall be as specified in Table 6.2E.2.2-1 for Power class 3 NR V2X UE and Table 6.2E.2.2-2 for power class 2 NR V2X UE.

**Table 6.2E.2.2-1: Maximum Power Reduction (MPR) for power class 3 NR V2X**

| Modulation |         | Channel bandwidth/MPR (dB) |                      |
|------------|---------|----------------------------|----------------------|
|            |         | Outer RB allocations       | Inner RB allocations |
| CP-OFDM    | QPSK    | $\leq 4.5$                 | $\leq 2.5$           |
|            | 16QAM   | $\leq 4.5$                 | $\leq 2.5$           |
|            | 64 QAM  | $\leq 4.5$                 |                      |
|            | 256 QAM | $\leq 7.0$                 |                      |

**Table 6.2E.2.2-2: Maximum Power Reduction (MPR) for power class 2 NR V2X**

| Modulation |         | Channel bandwidth/MPR (dB) |                      |
|------------|---------|----------------------------|----------------------|
|            |         | Outer RB allocations       | Inner RB allocations |
| CP-OFDM    | QPSK    | $\leq 5.5$                 | $\leq 2.5$           |
|            | 16QAM   |                            |                      |
|            | 64 QAM  | $\leq 6$                   | $\leq 4.5$           |
|            | 256 QAM | $\leq 7.0$                 |                      |

For NR V2X UE supporting SL MIMO or Tx diversity, the allowed MPR for the maximum output power for NR V2X physical channels PSCCH and PSSCH are specified in Table 6.2E.2.2-3 for power class 2 UE.

**Table 6.2E.2.2-3: Maximum Power Reduction (MPR) for power class 2 NR V2X with 2Tx**

| Modulation |         | Channel bandwidth/MPR (dB) |                      |
|------------|---------|----------------------------|----------------------|
|            |         | Outer RB allocations       | Inner RB allocations |
| CP-OFDM    | QPSK    | $\leq 6.0$                 | $\leq 3.0$           |
|            | 16QAM   |                            |                      |
|            | 64 QAM  | $\leq 7.0$                 | $\leq 5.5$           |
|            | 256 QAM | $\leq 9.0$                 |                      |

Where the following parameters are defined to specify valid RB allocation ranges for Outer and Inner RB allocations:

$N_{RB}$  is the maximum number of RBs for a given Channel bandwidth and sub-carrier spacing defined in Table 5.3.2-1.

$$RB_{Start,Low} = \max(1, \text{floor}(L_{CRB}/2))$$

where  $\max()$  indicates the largest value of all arguments and  $\text{floor}(x)$  is the greatest integer less than or equal to  $x$ .

$$RB_{Start,High} = N_{RB} - RB_{Start,Low} - L_{CRB}$$

The RB allocation is an Inner RB allocation if the following conditions are met

$$RB_{Start,Low} \leq RB_{Start} \leq RB_{Start,High}, \text{ and}$$

$$L_{CRB} \leq \text{ceil}(N_{RB}/2)$$

where  $\text{ceil}(x)$  is the smallest integer greater than or equal to  $x$ .

The RB allocation is an Outer RB allocation for all other allocations which are not an Inner RB allocation.

For PSFCH with single RB transmission for PC3 NR V2X UE, the required MPR is defined as follow

$$\text{MPR}_{\text{PSFCH}} = 3.5 \text{ dB}$$

For contiguous and non-contiguous allocation for simultaneous PSFCH transmission for PC3 NR V2X UE, the required MPR are specified as follow

$$\text{MPR}_{\text{PSFCH}} = \text{CEIL} \{M_{\text{A\_PSFCH}}, 0.5\}$$

Where  $M_{\text{A\_PSFCH}}$  for power class 3 is defined as follows

$$\begin{aligned} M_{\text{A\_PSFCH}} &= 7.5 \quad ; 0.00 < N_{\text{Gap}}/N_{\text{RB}} \leq 0.55 \\ &= 12.0 \quad ; 0.55 < N_{\text{Gap}}/N_{\text{RB}} \leq 1.0 \end{aligned}$$

For PSFCH with single RB transmission for PC2 NR V2X UE, the required MPR is defined as follow

$$\text{MPR}_{\text{PSFCH}} = 4.5 \text{ dB}$$

For contiguous and non-contiguous allocation for simultaneous PSFCH transmission for PC2 NR V2X UE, the required MPR are specified as follow

$$\text{MPR}_{\text{PSFCH}} = \text{CEIL} \{M_{\text{A\_PSFCH}}, 0.5\}$$

Where  $M_{\text{A}}$  is defined as follows

Where  $M_{\text{A\_PSFCH}}$  for power class 2 is defined as follows

$$\begin{aligned} M_{\text{A\_PSFCH}} &= 8.5 \quad ; 0.00 \leq N_{\text{Gap}}/N_{\text{RB}} < 0.4 \\ &= 10.0 \quad ; 0.4 \leq N_{\text{Gap}}/N_{\text{RB}} < 0.55 \\ &= 14.0 \quad ; 0.55 \leq N_{\text{Gap}}/N_{\text{RB}} \leq 1.0 \end{aligned}$$

Where,

$N_{\text{Gap}}$  is the gap RB amount between  $\text{RB}_{\text{start}}$  and  $\text{RB}_{\text{end}}$  for contiguous and non-contiguous allocation simultaneous PSFCH transmission. ( $N_{\text{Gap}} = \text{RB}_{\text{end}} - \text{RB}_{\text{start}}$ )

$\text{CEIL}\{M_{\text{A}}, 0.5\}$  means rounding upwards to closest 0.5dB.

The allowed MPR for the maximum output power for NR V2X physical channels on S-SSB transmission shall be specified in Table 6.2E.2.2-4 for power class 3 and power class 2.

**Table 6.2E.2.2-4: Maximum Power Reduction (MPR) for S-SSB transmission for power class 3 and power class 2 NR V2X**

| Channel | MPR <sub>S-SSB</sub> (dB) |                      |
|---------|---------------------------|----------------------|
|         | Outer RB allocations      | Inner RB allocations |
| S-SSB   | ≤ 6.0                     | ≤ 2.5                |

For NR V2X UE with two transmit antenna connectors, the allowed Maximum Power Reduction (MPR) values specified in clause 6.2E.2 for PC3 and PC2 shall apply to the maximum output power specified in Table 6.2E.1.1-1.

For the UE maximum output power modified by MPR, the power limits specified in clause 6.2E.4 apply.

### 6.2E.2.3 MPR for Power class 2 and Power class 3 V2X concurrent operation

For the inter-band concurrent NR V2X operation, the allowed maximum power reduction (MPR) for the maximum output power shall be applied per each component carrier. The MPR requirements in clause 6.2.2 apply for NR Uu operation in licensed band, and the MPR requirements in clause 6.2E.2 apply for NR sidelink operation in licensed band or Band n47.

For the intra-band concurrent NR V2X operation with contiguous RB allocation, the allowed maximum power reduction (MPR) for NR V2X physical channels PSCCH and PSSCH shall be as specified in Table 6.2E.2.3-1 for Power class 3 V2X concurrent UE.

**Table 6.2E.2.3-1: MPR for contiguous RB allocation for power class 3 NR V2X concurrent UE**

| Higher Modulation order between Sidelink and Uplink |        | MPR for bandwidth class B(dB) |                     |
|-----------------------------------------------------|--------|-------------------------------|---------------------|
|                                                     |        | Inner RB allocation           | Outer RB allocation |
| CP-OFDM                                             | QPSK   | $\leq 2.5$                    | $\leq 4.5$          |
|                                                     | 16QAM  | $\leq 2.5$                    | $\leq 4.5$          |
|                                                     | 64QAM  | $\leq 4.5$                    | $\leq 5.0$          |
|                                                     | 256QAM | $\leq 6.0$                    | $\leq 6.0$          |

For bandwidth class B with contiguous RB allocation, the following parameters are defined to specify valid RB allocation ranges for Inner and Outer RB allocations:

An RB allocation is contiguous if  $L_{CRB1} = 0$  or  $L_{CRB2} = 0$  or ( $L_{CRB1} \neq 0$  and  $L_{CRB2} \neq 0$  and  $RB_{Start1} + L_{CRB1} = N_{RB1}$  and  $RB_{Start2} = 0$ ), where  $RB_{Start1}$ ,  $L_{CRB1}$ , and  $N_{RB1}$  are for SL CC1,  $RB_{Start2}$ ,  $L_{CRB2}$ , and  $N_{RB2}$  are for UL CC2. SL CC1 is the component carrier with lower frequency.

In contiguous NR V2X intra-band concurrent operation, a contiguous allocation is an inner allocation if

$$RB_{Start,Low} \leq RB_{Start\_SL\&UL} \leq RB_{Start,High}, \text{ and } N_{RB\_alloc} \leq \text{ceil}(N_{RB,agg}/2),$$

where

$$RB_{Start,Low} = \max(1, \text{floor}(N_{RB\_alloc}/2))$$

$$RB_{Start,High} = N_{RB,agg} - RB_{Start,Low} - N_{RB,alloc},$$

with

$$N_{RB\_alloc} = L_{CRB1} \cdot 2^{\mu_1} + L_{CRB2} \cdot 2^{\mu_2}$$

$$N_{RB\_alloc} = (N_{RB1} - RB_{Start1}) \cdot 2^{\mu_1} + (RB_{Start2} + L_{CRB2}) \cdot 2^{\mu_2},$$

$$N_{RB,agg} = N_{RB1} \cdot 2^{\mu_1} + N_{RB2} \cdot 2^{\mu_2}.$$

$$\text{If } L_{CRB1} = 0, RB_{Start\_SL\&UL} = N_{RB1} \cdot 2^{\mu_1} + RB_{Start2} \cdot 2^{\mu_2},$$

$$\text{if } L_{CRB1} > 0, RB_{Start\_SL\&UL} = RB_{Start1} \cdot 2^{\mu_1}.$$

Where,  $\mu_1$  and  $\mu_2$  is 0, 1 and 2 for SCS of 15kHz, 30kHz and 60kHz respectively.

A contiguous allocation that is not an Inner contiguous allocation is an Outer contiguous allocation.

For the intra-band concurrent NR V2X operation with non-contiguous RB allocation, the allowed maximum power reduction (MPR) for NR V2X physical channels PSCCH and PSSCH shall be as specified in Table 6.2E.2.3-2 for Power class 3 V2X concurrent UE.

**Table 6.2E.2.3-2: MPR for non-contiguous RB allocation for power class 3 NR V2X concurrent UE**

| Higher Modulation order between Sidelink and Uplink |        | MPR for bandwidth class B(dB) |                      |                      |
|-----------------------------------------------------|--------|-------------------------------|----------------------|----------------------|
|                                                     |        | Inner RB allocation           | Outer1 RB allocation | Outer2 RB allocation |
| CP-OFDM                                             | QPSK   | $\leq 2.5$                    | $\leq 4.0$           | $\leq 4.5$           |
|                                                     | 16QAM  | $\leq 2.5$                    | $\leq 4.0$           | $\leq 4.5$           |
|                                                     | 64QAM  | $\leq 4.5$                    | $\leq 4.5$           | $\leq 5.0$           |
|                                                     | 256QAM | $\leq 6.0$                    | $\leq 6.0$           | $\leq 6.0$           |

For bandwidth classes B with non-contiguous RB allocation, the following parameters are defined to specify valid RB allocation ranges for Inner, Outer1 and Outer2 RB allocations:

Non-Contiguous RB allocation is defined as  $RB_{Start1} + L_{CRB1} < N_{RB1}$ , or  $RB_{Start2} > 0$ , when both SL CC and UL CC are activated and allocated with RB(s), where  $RB_{Start1}$ ,  $L_{CRB1}$ , and  $N_{RB1}$  are for SL CC1,  $RB_{Start2}$ ,  $L_{CRB2}$ , and  $N_{RB2}$  are for UL CC2. SL CC1 is the component carrier with lower frequency.

In contiguous NR V2X intra-band concurrent operation, a non-contiguous RB allocation is a non-contiguous Inner RB allocation if the following conditions are met:

$$RB_{Start,Low} \leq RB_{Start\_CA} \leq RB_{Start,High} \text{ and } N_{RB\_alloc} \leq \text{ceil}((BW_{Channel\_SL\&UL} / 3 - BW_{gap}) / 0.18\text{MHz}),$$

where

$$N_{RB\_alloc} = (N_{RB1} - RB_{Start1}) \cdot 2^{\mu_1} + (RB_{Start2} + L_{CRB2}) \cdot 2^{\mu_2}, RB_{Start\_SL\&UL} = RB_{Start1} \cdot 2^{\mu_1}$$

$$RB_{Start,Low} = \max(1, \text{floor}(N_{RB\_alloc} + (BW_{gap} - BW_{GB,low})/0.18\text{MHz}))$$

$$RB_{Start,High} = \text{floor}((BW_{Channel\_SL\&UL} - 2 \cdot BW_{gap} - BW_{GB,low})/0.18\text{MHz} - 2 \cdot N_{RB\_alloc})$$

$$BW_{GB,low} = F_{offset,low} - (N_{RB1} \cdot 12 + 1) \cdot SCS_1/2$$

$BW_{gap}$  is the bandwidth of the gap between  $N_{RB1}$  and  $N_{RB2}$  possible allocations of SL CC1 and UL CC2 respectively.

In contiguous NR V2X intra-band concurrent operation, a non-contiguous RB allocation is a non-contiguous outer 1 RB allocation if the following conditions are met:

$$RB_{Start,Low} \leq RB_{Start\_SL\&UL} \leq RB_{Start,High} \text{ and } N_{RB\_alloc} \leq \text{ceil}((3 BW_{Channel\_SL\&UL} / 5 - BW_{gap}) / 0.18\text{MHz})$$

where

$$RB_{Start,Low} = \max(1, 2 \cdot N_{RB\_alloc} - \text{floor}((BW_{Channel\_SL\&UL} - 2 \cdot BW_{gap} + BW_{GB,low})/0.18\text{MHz})),$$

$$RB_{Start,High} = \text{floor}((2 \cdot BW_{Channel\_SL\&UL} - 3 \cdot BW_{gap} - BW_{GB,low}) / 0.18\text{MHz} - 3 \cdot N_{RB\_alloc})$$

$N_{RB\_alloc}$ ,  $RB_{Start\_SL\&UL}$ ,  $BW_{gap}$  and  $BW_{GB,low}$  are as defined for the Inner region.

In contiguous NR V2X intra-band concurrent operation, a non-contiguous allocation is an Outer 2 allocation if it is neither a non-contiguous Inner allocation nor an Outer 1 allocation.

For PSFCH with single RB transmission for PC3 NR V2X intra-band concurrent UE, the required MPR is specified in clause 6.2E.2.2 shall be applied.

For the allowed MPR for S-SSB transmission for PC3 NR V2X intra-band concurrent UE, the required MPR is specified in clause 6.2E.2.2 shall be applied.

For the intra-band concurrent NR V2X operation with contiguous RB allocation in contiguous carrier, the allowed maximum power reduction (MPR) for NR V2X physical channels PSCCH and PSSCH shall be as specified in Table 6.2E.2.3-3 for Power class 2 V2X concurrent UE.

**Table 6.2E.2.3-3: MPR for contiguous RB allocation for power class 2 NR V2X concurrent UE**

| Higher Modulation order between Sidelink and Uplink |        | MPR for bandwidth class B(dB) |                     |
|-----------------------------------------------------|--------|-------------------------------|---------------------|
|                                                     |        | Inner RB allocation           | Outer RB allocation |
| CP-OFDM                                             | QPSK   | ≤ 3.0                         | ≤ 5.5               |
|                                                     | 16QAM  | ≤ 4.0                         | ≤ 5.5               |
|                                                     | 64QAM  | ≤ 5.5                         | ≤ 6.0               |
|                                                     | 256QAM | ≤ 7.5                         | ≤ 7.5               |

For the intra-band concurrent NR V2X operation with non-contiguous RB allocation in contiguous carrier, the allowed maximum power reduction (MPR) for NR V2X physical channels PSCCH and PSSCH shall be as specified in Table 6.2E.2.3-4 for Power class 2 V2X concurrent UE.



**Table 6.2E.2.3-4: MPR for non-contiguous RB allocation for power class 2 NR V2X concurrent UE**

| Higher Modulation order between Sidelink and Uplink |        | MPR for bandwidth class B(dB) |                      |                      |
|-----------------------------------------------------|--------|-------------------------------|----------------------|----------------------|
|                                                     |        | Inner RB allocation           | Outer1 RB allocation | Outer2 RB allocation |
| CP-OFDM                                             | QPSK   | $\leq 3.0$                    | $\leq 5.5$           | $\leq 6.0$           |
|                                                     | 16QAM  | $\leq 4.5$                    | $\leq 5.5$           | $\leq 6.5$           |
|                                                     | 64QAM  | $\leq 5.5$                    | $\leq 6.5$           | $\leq 7.0$           |
|                                                     | 256QAM | $\leq 8.0$                    | $\leq 8.0$           | $\leq 8.0$           |

The parameters in clause 6.2E.2.3 are considered to determine MPR values according to RB allocation.

For PSFCH with single RB transmission for PC2 NR V2X intra-band concurrent UE, the required MPR is specified in clause 6.2E.2.2 shall be applied.

For the allowed MPR for S-SSB transmission for PC2 NR V2X intra-band concurrent UE, the required MPR is specified in clause 6.2E.2.2 shall be applied.

#### 6.2E.2.4 MPR for Power class 1 UE in Band n14

For NR Public Safety (PS) UE with contiguous allocation of PSCCH and PSSCH simultaneous transmission, the allowed NR PS UE maximum output power reduction for power class 1 UE shall meet the NR V2X MPR values specified in Table 6.2E.2.2-1 of clause 6.2E.2.2.

For NR Public Safety (PS) UE of single or multiple PSFCH simultaneous transmission, the allowed NR PS UE maximum output power reduction for power class 1 UE shall meet the NR V2X MPR values for PC3 UE's PSFCH transmission in clause 6.2E.2.2.

For NR Public Safety (PS) UE of S-SSB transmission, the allowed NR PS UE maximum output power reduction for power class 1 UE shall meet the NR V2X MPR values specified in Table 6.2E.2.2-2 of clause 6.2E.2.2.

### 6.2E.3 UE additional maximum output power reduction for V2X

#### 6.2E.3.1 General

For the applied maximum output power reduction is obtained by taking the maximum value of MPR requirements specified in clause 6.2E.2 and A-MPR requirements specified in current clause.

Additional emission requirements can be indicated by the network or pre-configured radio parameters. Each additional emission requirement is associated with a unique network signalling (NS) value indicated in RRC signalling by an NR frequency band number of the applicable operating band and an associated value in the field *[additionalSpectrumEmission]*. Throughout this specification, the notion of indication or signalling of an NS value refers to the corresponding indication of an NR V2X frequency band number of the applicable operating band, the IE field *[freqBandIndicatorNR]* and an associated value of *[additionalSpectrumEmission]* in the relevant RRC information elements [7].

To meet the additional requirements, additional maximum power reduction (A-MPR) is allowed for the maximum output power as specified in Table 6.2.1-1. Outer and inner allocation notation used in clause 6.2E.3 is defined in clause 6.2E.2. In absence of modulation and waveform types the A-MPR applies to all modulation and waveform types.

**Table 6.2E.3.1-1: Additional Maximum Power Reduction (A-MPR) for PC3 NR V2X**

| Network Signalling value | Requirements (clause) | NR Band | Channel bandwidth (MHz) | Resources Blocks ( $N_{RB}$ ) | A-MPR (dB) |
|--------------------------|-----------------------|---------|-------------------------|-------------------------------|------------|
|--------------------------|-----------------------|---------|-------------------------|-------------------------------|------------|

|       |                                       |                |                |                 |     |
|-------|---------------------------------------|----------------|----------------|-----------------|-----|
| NS_01 |                                       | Table 5.2E.1-1 | 10, 20, 30, 40 | Table 5.3.2-1   | N/A |
| NS_06 | 6.5.2.3.4 (A-SEM)                     | n14            | 5, 10          | Table 5.3.2-1   | N/A |
| NS_33 | 6.5E.2.3.1 (A-SEM)<br>6.5E.3.4 (A-SE) | n47            | 10             | Clause 6.2E.3.2 |     |
| NS_52 | 6.5E.2.3.2 (A-SEM)                    | n47            | 40             | Clause 6.2E.3.3 |     |

**Table 6.2E.3.1-2: Mapping of network signaling label**

| NR V2X operating bands                                                                                                                              | Value of additionalSpectrumEmission |       |       |   |   |   |   |   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|-------|-------|---|---|---|---|---|
|                                                                                                                                                     | 0                                   | 1     | 2     | 3 | 4 | 5 | 6 | 7 |
| n14 <sup>2</sup>                                                                                                                                    | NS_01                               | NS_06 |       |   |   |   |   |   |
| n38                                                                                                                                                 | NS_01                               |       |       |   |   |   |   |   |
| n47                                                                                                                                                 | NS_01                               | NS_33 | NS_52 |   |   |   |   |   |
| NOTE 1: [additionalSpectrumEmission] corresponds to an information element of the same name defined in clause 6.3.2 of TS 38.331 [7].               |                                     |       |       |   |   |   |   |   |
| NOTE 2: For the NR PS UE in n14, same A-MPR shall be applied for PC1 PS UE since PC1 PS UE for Band n14 is not targeted for smartphone form factor. |                                     |       |       |   |   |   |   |   |

For UE with two transmit antenna connectors, the A-MPR values specified in clause 6.2E.3.2 and 6.2E.3.3 shall apply to the maximum output power specified in Table 6.2E.1.1-1. Unless stated otherwise, an A-MPR of 0 dB shall be used.

For the UE maximum output power modified by A-MPR, the power limits specified in clause 6.2E.4 apply.

### 6.2E.3.2 A-MPR for V2X UE by NS\_33

When NS\_33 is indicated by the network or pre-configured radio parameters for NR V2X UE, the additional maximum output power reduction specified as

$$A-MPR = \text{CEIL} \{M_A, 0.5\}$$

Where  $M_A$  is defined as follows

$$M_A = A-MPR_{\text{Base}} + G_{\text{post connector}} * A-MPR_{\text{Step}}$$

$\text{CEIL} \{M_A, 0.5\}$  means rounding upwards to closest 0.5dB.

$A-MPR_{\text{Base}}$  and  $A-MPR_{\text{Step}}$  are specified in Tables 6.2E.3.2-1, 6.2E.3.2-2 is allowed when network signalling value is provided.  $A-MPR_{\text{Base}}$  is the default A-MPR value when no  $G_{\text{post connector}}$  is declared. The supported post antenna connector gain  $G_{\text{post connector}}$  is declared by the UE following the principle described in annex I in [11]. The  $A-MPR_{\text{Step}}$  is the increase in A-MPR allowance to allow UE to meet tighter conducted A-SE and A-SEM requirements with higher value of declared  $G_{\text{post connector}}$ .

For the contiguous PSSCH and PSCCH transmission when NS\_33 is indicated by the network or pre-configured radio parameters for NR V2X UE, the NR UE allow the follow A-MPR requirements specified in Table 6.2E.3.2-1 and 6.2E.3.2-2 for power class 3. And A-MPR requirements specified in Table 6.2E.3.2-2a and 6.2E.3.2-2b for power class 2 are allowed for NR V2X UE.

**Table 6.2E.3.2-1: PC3 A-MPR for PSSCH/PSCCH by NS\_33 (at  $F_c = 5860\text{MHz}$ , and  $5920\text{MHz}$ )**

| Carrier frequency [MHz] | Region                    |                                   | A-MPR <sub>Base</sub> (dB) |       |        |
|-------------------------|---------------------------|-----------------------------------|----------------------------|-------|--------|
|                         | LCRB* 12*SCS [MHz]        | RB <sub>start</sub> *12*SCS [MHz] | QPSK/16QAM                 | 64QAM | 256QAM |
| 5860                    | $\geq 1.8$ and $\leq 2.7$ | 0                                 | $\leq 24.0$                |       |        |
|                         |                           | $\geq 0.18$ and $\leq 0.54$       | $\leq 19.0$                |       |        |
|                         |                           | $\geq 4.68$                       | $\leq 6.0$                 |       |        |
|                         | $\geq 1.8$ and $\leq 3.6$ | $\geq 2.16$ and $\leq 2.52$       | $\leq 11.0$                |       |        |
|                         |                           | $\geq 2.7$ and $\leq 3.42$        | $\leq 9.5$                 |       |        |
|                         |                           | $\geq 3.6$ and $\leq 4.5$         | $\leq 8.0$                 |       |        |

|                         | > 2.7 and < 4.5                    | $\geq 4.5$                          | $\leq 8.0$  |       |        |
|-------------------------|------------------------------------|-------------------------------------|-------------|-------|--------|
|                         | $\geq 1.8$ and < 7.2               | $\geq 0.72$ and $\leq 1.26$         | $\leq 16.0$ |       |        |
|                         |                                    | $\geq 1.44$ and $\leq 1.98$         | $\leq 13.5$ |       |        |
|                         | $\geq 3.6$ and < 7.2               | $\geq 0$ and $\leq 0.54$            | $\leq 22.0$ |       |        |
|                         | $\geq 4.32$ and < 7.2              | $\geq 2.88$ and $\leq 3.78$         | $\leq 9.5$  |       |        |
|                         |                                    | $\geq 3.96$ and $\leq 4.86$         | $\leq 8.0$  |       |        |
|                         | $\geq 4.32$ and $\leq 7.2$         | $\geq 2.16$ and $\leq 2.7$          | $\leq 12.0$ |       |        |
|                         | 7.2 and 8.1                        | $\geq 0$ and $\leq 0.18$            | $\leq 19.0$ |       |        |
|                         |                                    | $\geq 0.36$ and $\leq 0.9$          | $\leq 16.0$ |       |        |
|                         |                                    | $\geq 1.08$ and $\leq 1.98$         | $\leq 13.5$ |       |        |
|                         | > 8.1                              | $\geq 0$                            | $\leq 16.0$ |       |        |
| Carrier frequency [MHz] | $L_{CRB} \cdot 12 \cdot SCS$ [MHz] | $RB_{end} \cdot 12 \cdot SCS$ [MHz] | QPSK/16QAM  | 64QAM | 256QAM |
| 5920                    | $\geq 1.8$ and $\leq 2.7$          | 9.36                                | $\leq 24.0$ |       |        |
|                         |                                    | $\geq 8.82$ and $\leq 9.18$         | $\leq 19.0$ |       |        |
|                         |                                    | $\leq 4.68$                         | $\leq 6.0$  |       |        |
|                         | $\geq 1.8$ and $\leq 3.6$          | $\geq 6.84$ and $\leq 7.2$          | $\leq 11.0$ |       |        |
|                         |                                    | $\geq 5.94$ and $\leq 6.66$         | $\leq 9.5$  |       |        |
|                         |                                    | $\geq 4.86$ and $\leq 5.76$         | $\leq 8.0$  |       |        |
|                         | > 2.7 and < 4.5                    | $\leq 4.86$                         | $\leq 8.0$  |       |        |
|                         | $\geq 1.8$ and < 7.2               | $\geq 8.1$ and $\leq 8.64$          | $\leq 16.0$ |       |        |
|                         |                                    | $\geq 7.38$ and $\leq 7.92$         | $\leq 13.5$ |       |        |
|                         | $\geq 3.6$ and < 7.2               | $\geq 8.82$ and $\leq 9.36$         | $\leq 22.0$ |       |        |
|                         | $\geq 4.32$ and < 7.2              | $\geq 5.58$ and $\leq 6.48$         | $\leq 9.5$  |       |        |
|                         |                                    | $\geq 4.5$ and $\leq 5.4$           | $\leq 8.0$  |       |        |
|                         | $\geq 4.32$ and $\leq 7.2$         | $\geq 6.66$ and $\leq 7.2$          | $\leq 12.0$ |       |        |
|                         | 7.2 and 8.1                        | $\geq 9.18$ and $\leq 9.36$         | $\leq 19.0$ |       |        |
|                         |                                    | $\geq 8.46$ and $\leq 9.0$          | $\leq 16.0$ |       |        |
|                         |                                    | $\geq 7.38$ and $\leq 8.28$         | $\leq 13.5$ |       |        |
|                         | > 8.1                              | $\leq 9.36$                         | $\leq 16.0$ |       |        |

NOTE 1: A-MPR<sub>step</sub>=1.2 dB is applied for RB<sub>start</sub> 0 and 1 and A-MPR<sub>step</sub>=0.7 dB is applied for all other RB<sub>start</sub>

NOTE 2: Applicable for Channel Bandwidth = 10 MHz

Table 6.2E.3.2-2: PC3 A-MPR for PSSCH/PSCCH by NS\_33 (at other carrier frequency)

| Carrier frequency [MHz]      | RB allocations | A-MPR <sub>Base</sub> (dB) |       |            |            | A-MPR <sub>step</sub> (dB) |
|------------------------------|----------------|----------------------------|-------|------------|------------|----------------------------|
|                              |                | QPSK                       | 16QAM | 64QAM      | 256QAM     |                            |
| 5870, 5880, 5890, 5900, 5910 | Inner          | $\leq 3.0$                 |       | $\leq 5.0$ | $\leq 6.0$ | 0.5                        |
|                              | Outer          | $\leq 4.5$                 |       |            |            |                            |

NOTE 1: Inner and Outer RB allocations are defined in clause 6.2E.2.2

NOTE 2: Applicable for Channel Bandwidth = 10 MHz

Table 6.2E.3.2-2a: PC2 A-MPR for PSCCH/PSSCH by NS\_33 (at Fc=5860MHz, and 5920MHz)

| Carrier frequency [MHz] | $L_{CRB} \cdot 12 \cdot SCS$ [MHz] | $RB_{start} \cdot 12 \cdot SCS$ [MHz] | A-MPR(dB)   |       |        |
|-------------------------|------------------------------------|---------------------------------------|-------------|-------|--------|
|                         |                                    |                                       | QPSK/16QAM  | 64QAM | 256QAM |
| 5860                    | $\geq 1.8$ and $\leq 2.7$          | $\geq 0$ and $\leq 0.18$              | $\leq 24$   |       |        |
|                         |                                    | $\geq 0.36$ and $\leq 0.54$           | $\leq 22$   |       |        |
|                         |                                    | 0.72                                  | $\leq 20$   |       |        |
|                         | $\geq 1.8$ and $\leq 4.5$          | $\geq 0.9$ and $\leq 1.26$            | $\leq 17.5$ |       |        |
|                         | $\geq 1.8$ and $\leq 5.4$          | 1.8                                   | $\leq 16$   |       |        |
|                         | $\geq 1.8$                         | $\geq 1.44$ and $\leq 1.62$           | $\leq 16$   |       |        |
|                         |                                    | $\geq 1.98$ and $\leq 2.52$           | $\leq 14.5$ |       |        |
|                         |                                    | $\geq 2.7$ and $\leq 3.42$            | $\leq 13$   |       |        |
|                         |                                    | $\geq 3.6$ and $\leq 4.32$            | $\leq 11.5$ |       |        |
|                         |                                    | $\geq 4.5$ and $\leq 5.22$            | $\leq 10$   |       |        |
|                         |                                    | $\geq 5.4$                            | $\leq 8.5$  |       |        |
|                         | $\geq 3.6$ and $\leq 4.32$         | 0.18                                  | $\leq 22$   |       |        |
|                         | $\geq 3.6$ and $\leq 5.4$          | 0                                     | $\leq 22$   |       |        |

|                                                                                                                                                                 |                            |                             |             |       |        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-----------------------------|-------------|-------|--------|
|                                                                                                                                                                 |                            | $\geq 0.36$ and $\leq 0.54$ | $\leq 20$   |       |        |
|                                                                                                                                                                 |                            | 0.72                        | $\leq 17.5$ |       |        |
|                                                                                                                                                                 | $\geq 25$ and $\leq 40$    | 0.18                        | $\leq 20$   |       |        |
|                                                                                                                                                                 | $\geq 5.4$                 | $\geq 0.9$ and $\leq 1.26$  | $\leq 16$   |       |        |
|                                                                                                                                                                 | $\geq 6.48$                | 0                           | $\leq 20$   |       |        |
|                                                                                                                                                                 |                            | $\geq 0.36$ and $\leq 0.72$ | $\leq 17.5$ |       |        |
|                                                                                                                                                                 |                            | 1.8                         | $\leq 14.5$ |       |        |
|                                                                                                                                                                 | $\geq 8.1$                 | 0.18                        | $\leq 17.5$ |       |        |
| Carrier frequency [MHz]                                                                                                                                         | $L_{CRB}^*12^*SCS$ [MHz]   | $RB_{end}^*12^*SCS$ [MHz]   | A-MPR(dB)   |       |        |
|                                                                                                                                                                 |                            |                             | QPSK/16QAM  | 64QAM | 256QAM |
| 5920                                                                                                                                                            | $\geq 1.8$ and $\leq 2.7$  | $\geq 9.18$ and $\leq 9.36$ | $\leq 24$   |       |        |
|                                                                                                                                                                 |                            | $\geq 8.82$ and $\leq 9.0$  | $\leq 22$   |       |        |
|                                                                                                                                                                 |                            | 8.64                        | $\leq 20$   |       |        |
|                                                                                                                                                                 | $\geq 1.8$ and $\leq 4.5$  | $\geq 8.1$ and $\leq 8.46$  | $\leq 17.5$ |       |        |
|                                                                                                                                                                 | $\geq 1.8$ and $\leq 5.4$  | 7.56                        | $\leq 16$   |       |        |
|                                                                                                                                                                 | $\geq 1.8$                 | $\geq 7.74$ and $\leq 7.92$ | $\leq 16$   |       |        |
|                                                                                                                                                                 |                            | $\geq 6.84$ and $\leq 7.38$ | $\leq 14.5$ |       |        |
|                                                                                                                                                                 |                            | $\geq 5.94$ and $\leq 6.66$ | $\leq 13$   |       |        |
|                                                                                                                                                                 |                            | $\geq 5.04$ and $\leq 5.76$ | $\leq 11.5$ |       |        |
|                                                                                                                                                                 |                            | $\geq 4.14$ and $\leq 4.86$ | $\leq 10$   |       |        |
|                                                                                                                                                                 |                            | $\geq 3.96$                 | $\leq 8.5$  |       |        |
|                                                                                                                                                                 | $\geq 3.6$ and $\leq 4.32$ | 9.18                        | $\leq 22$   |       |        |
|                                                                                                                                                                 | $\geq 3.6$ and $\leq 5.4$  | 9.36                        | $\leq 22$   |       |        |
|                                                                                                                                                                 |                            | $\geq 8.82$ and $\leq 9.0$  | $\leq 20$   |       |        |
|                                                                                                                                                                 |                            | 8.64                        | $\leq 17.5$ |       |        |
|                                                                                                                                                                 | $\geq 25$ and $\leq 40$    | 9.18                        | $\leq 20$   |       |        |
|                                                                                                                                                                 | $\geq 5.4$                 | $\geq 8.1$ and $\leq 8.46$  | $\leq 16$   |       |        |
|                                                                                                                                                                 | $\geq 6.48$                | 9.36                        | $\leq 20$   |       |        |
|                                                                                                                                                                 |                            | $\geq 8.64$ and $\leq 9.0$  | $\leq 17.5$ |       |        |
|                                                                                                                                                                 |                            | 7.56                        | $\leq 14.5$ |       |        |
|                                                                                                                                                                 | $\geq 8.1$                 | 9.18                        | $\leq 17.5$ |       |        |
| NOTE 1: A-MPR <sub>step</sub> =1.2 dB is applied for RB <sub>start</sub> 0 and 1 and A-MPR <sub>step</sub> =0.7 dB is applied for all other RB <sub>start</sub> |                            |                             |             |       |        |
| NOTE 2: Applicable for Channel Bandwidth = 10 MHz                                                                                                               |                            |                             |             |       |        |

Table 6.2E.3.2-2b: PC2 A-MPR for PSSCH/PSCCH by NS\_33 (at other carrier frequency)

| Carrier frequency [MHz]                                               | RB allocations | A-MPR (dB) |       |       |        |  |
|-----------------------------------------------------------------------|----------------|------------|-------|-------|--------|--|
|                                                                       |                | QPSK       | 16QAM | 64QAM | 256QAM |  |
| 5870,5910                                                             | outer          | ≤ 8.5      |       |       | ≤ 8.5  |  |
|                                                                       | inner          | ≤ 6.0      |       |       |        |  |
| 5880,5890,5900                                                        | outer          | ≤ 6.0      |       |       | ≤ 6.5  |  |
|                                                                       | inner          | ≤ 3.5      |       | ≤ 4.5 |        |  |
| NOTE 1: Inner and Outer RB allocations are defined in clause 6.2E.2.1 |                |            |       |       |        |  |
| NOTE 2: Applicable for Channel Bandwidth = 10 MHz                     |                |            |       |       |        |  |

For the simultaneous PSFCH transmission when NS\_33 is indicated by the network or pre-configured radio parameters for NR V2X UE, the NR UE allow the follow A-MPR requirements specified in Table 6.2E.3.2-3 for power class 3 and in Table 6.2E.3.2-3a for power class 2.

Table 6.2E.3.2-3: PC3 A-MPR for simultaneous PSFCH by NS\_33

| Channel Bandwidth [MHz] | Center Frequency [MHz]       | RB allocation       | A-MPR <sub>Base</sub> (dB)       |                                    |                                    | A-MPR <sub>step</sub> (dB) |
|-------------------------|------------------------------|---------------------|----------------------------------|------------------------------------|------------------------------------|----------------------------|
|                         |                              |                     | $0 \leq N_{Gap} / N_{RB} < 0.15$ | $0.15 \leq N_{Gap} / N_{RB} < 0.3$ | $0.3 \leq N_{Gap} / N_{RB} \leq 1$ |                            |
| 10                      | 5860, 5920                   | N <sub>RB</sub> = 1 | 19.0                             |                                    |                                    | 1.0                        |
|                         |                              | N <sub>RB</sub> > 1 | 22.0                             |                                    |                                    |                            |
|                         | 5870, 5880, 5890, 5900, 5910 | N <sub>RB</sub> = 1 | 5                                |                                    |                                    | 0.8                        |
|                         |                              | N <sub>RB</sub> > 1 | 14                               | 7                                  | 18.5                               |                            |

Note 1:  $N_{\text{Gap}}$  is the gap RB amount between  $\text{RB}_{\text{start}}$  and  $\text{RB}_{\text{end}}$  for contiguous and non-contiguous allocation simultaneous PSFCH transmission. ( $N_{\text{Gap}} = \text{RB}_{\text{end}} - \text{RB}_{\text{start}}$ )

Table 6.2E.3.2-3a: PC2 A-MPR for simultaneous PSFCH by NS\_33

| Channel Bandwidth [MHz]                                                                                                                                                                                                                                              | Center Frequency [MHz]       | RB allocation       | A-MPR <sub>Base</sub> (dB)                    |                                                 |                                                  | A-MPR <sub>step</sub> (dB) |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------|-----------------------------------------------|-------------------------------------------------|--------------------------------------------------|----------------------------|
|                                                                                                                                                                                                                                                                      |                              |                     | $0 \leq N_{\text{Gap}} / N_{\text{RB}} < 0.2$ | $0.2 \leq N_{\text{Gap}} / N_{\text{RB}} < 0.4$ | $0.4 \leq N_{\text{Gap}} / N_{\text{RB}} \leq 1$ |                            |
| 10                                                                                                                                                                                                                                                                   | 5860, 5920                   | $N_{\text{RB}} = 1$ | 25.0                                          |                                                 |                                                  | 1.0                        |
|                                                                                                                                                                                                                                                                      |                              | $N_{\text{RB}} > 1$ | 22.0                                          |                                                 |                                                  |                            |
|                                                                                                                                                                                                                                                                      | 5870, 5880, 5890, 5900, 5910 | $N_{\text{RB}} = 1$ | 5                                             |                                                 |                                                  | 0.8                        |
|                                                                                                                                                                                                                                                                      |                              | $N_{\text{RB}} > 1$ | 16.5                                          | 12                                              | 20                                               |                            |
| Note 1: $N_{\text{Gap}}$ is the gap RB amount between $\text{RB}_{\text{start}}$ and $\text{RB}_{\text{end}}$ for contiguous and non-contiguous allocation simultaneous PSFCH transmission. ( $N_{\text{Gap}} = \text{RB}_{\text{end}} - \text{RB}_{\text{start}}$ ) |                              |                     |                                               |                                                 |                                                  |                            |

For the S-SSB transmission when NS\_33 is indicated by the network or pre-configured radio parameters for NR V2X UE, the NR UE allow the follow A-MPR requirements specified in Table 6.2E.3.2-4 for power class 3 and in Table 6.2E.3.2-5 for power class 2.

Table 6.2E.3.2-4: PC3 A-MPR for S-SSB transmission by NS\_33

| Carrier Frequency (MHz)      | $\text{RB}_{\text{start}} * 12 * \text{SCS}$ [MHz] | A-MPR <sub>Base</sub> (dB) | AMPR <sub>step</sub> (dB) |
|------------------------------|----------------------------------------------------|----------------------------|---------------------------|
| 5860                         | $\leq 1.0$                                         | $\leq 25$                  | 0.6                       |
|                              | $> 1.0$ and $\leq 2.0$                             | $\leq 19$                  |                           |
|                              | $> 2.0$ and $\leq 3.24$                            | $\leq 12$                  |                           |
|                              | $> 3.24$ and $\leq 3.6$                            | $\leq 10$                  |                           |
|                              | $> 3.6$                                            | $\leq 9$                   |                           |
| 5870, 5880, 5890, 5900, 5910 | $\leq 1.0$                                         | $\leq 7.0$                 | 0.85                      |
|                              | $> 1.0$ and $\leq 1.6$                             | $\leq 6.5$                 |                           |
|                              | $> 1.6$ and $\leq 2.6$                             | $\leq 5.8$                 |                           |
|                              | $> 2.6$ and $\leq 3.24$                            | $\leq 4.5$                 |                           |
|                              | $> 3.24$ and $\leq 4.32$                           | $\leq 5.5$                 |                           |
| Carrier Frequency (MHz)      | $\text{RB}_{\text{end}} * 12 * \text{SCS}$ [MHz]   | A-MPR <sub>Base</sub> (dB) | AMPR <sub>step</sub> (dB) |
|                              | 5920                                               | $\geq 8.36$                | 0.6                       |
|                              |                                                    | $\geq 7.36$ and $< 8.36$   |                           |
|                              |                                                    | $\geq 6.12$ and $< 7.36$   |                           |
|                              |                                                    | $\geq 5.76$ and $< 6.12$   |                           |
|                              |                                                    | $< 5.76$                   |                           |

Table 6.2E.3.2-5: PC2 A-MPR for S-SSB transmission by NS\_33

| Carrier Frequency (MHz)      | $\text{RB}_{\text{start}} * 12 * \text{SCS}$ [MHz] | A-MPR <sub>Base</sub> (dB) | AMPR <sub>step</sub> (dB) |
|------------------------------|----------------------------------------------------|----------------------------|---------------------------|
| 5860                         | $\leq 1.0$                                         | $\leq 25$                  | 0.6                       |
|                              | $> 1.0$ and $\leq 2.0$                             | $\leq 19$                  |                           |
|                              | $> 2.0$ and $\leq 3.24$                            | $\leq 12$                  |                           |
|                              | $> 3.24$ and $\leq 3.6$                            | $\leq 10$                  |                           |
|                              | $> 3.6$                                            | $\leq 9$                   |                           |
| 5870, 5880, 5890, 5900, 5910 | $\leq 1.0$                                         | $\leq 7.0$                 | 0.85                      |
|                              | $> 1.0$ and $\leq 1.6$                             | $\leq 6.5$                 |                           |
|                              | $> 1.6$ and $\leq 2.6$                             | $\leq 5.8$                 |                           |

|                                |                                        |                                  |                                 |
|--------------------------------|----------------------------------------|----------------------------------|---------------------------------|
|                                | >2.6 and ≤3.24                         | ≤ 4.5                            |                                 |
|                                | >3.24 and ≤4.32                        | ≤ 5.5                            |                                 |
|                                | >4.32                                  | ≤ 6.5                            |                                 |
| <b>Carrier Frequency (MHz)</b> | <b>RB<sub>end</sub> * 12*SCS [MHz]</b> | <b>A-MPR<sub>Base</sub> (dB)</b> | <b>AMPR<sub>Step</sub> (dB)</b> |
| 5920                           | ≥ 8.36                                 | ≤ 25                             | 0.6                             |
|                                | ≥ 7.36 and < 8.36                      | ≤ 19                             |                                 |
|                                | ≥ 6.12 and < 7.36                      | ≤ 12                             |                                 |
|                                | ≥ 5.76 and < 6.12                      | ≤ 10                             |                                 |
|                                | < 5.76                                 | ≤ 9                              |                                 |

### 6.2E.3.3 A-MPR for Power class 3 V2X UE by NS\_52

When NS\_52 is indicated by the network or pre-configured radio parameters for NR V2X UE, the additional maximum output power reduction specified as

$$A-MPR = \text{CEIL} \{M_A, 0.5\}$$

Where  $M_A$  is defined as follows

$$M_A = A-MPR$$

CEIL{ $M_A$ , 0.5} means rounding upwards to closest 0.5dB.

For the contiguous PSSCH and PSCCH transmission when NS\_52 is indicated by the network or pre-configured radio parameters for NR V2X UE, the NR UE allow the follow A-MPR requirements.

**Table 6.2E.3.3-1: A-MPR for PSSCH/PSCCH by NS\_52**

| Carrier frequency(MHz) | Modulation | A-MPR(dB) |          |          |
|------------------------|------------|-----------|----------|----------|
|                        |            | Region 1  | Region 2 | Region 3 |
| 5885                   | QPSK       | ≤ 15      | ≤ 8.0    | ≤ 5.5    |
|                        | 16QAM      |           | ≤ 8.0    | ≤ 5.5    |
|                        | 64QAM      |           | ≤ 8.5    | ≤ 5.5    |
|                        | 256QAM     |           | ≤ 8.5    | ≤ 6.0    |
| Note1: Void.           |            |           |          |          |

Where the following parameters are defined to specify valid RB allocation ranges for Region1, Region2 and Region3 according to RB allocations:

**Table 6.2E.3.3-1a: A-MPR Region definitions for PSSCH/PSCCH by NS\_52**

| Channel Bandwidth, MHz | Carrier frequency (MHz) | A-MPR parameters for region definitions                                                                                |                                                | A-MPR    |
|------------------------|-------------------------|------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|----------|
|                        |                         | RB <sub>start</sub> or RB <sub>end</sub>                                                                               | L <sub>CRB</sub>                               |          |
| 40                     | 5885                    | RB <sub>start</sub> ≤ floor(N <sub>RB</sub> *0.2) or RB <sub>end</sub> ≥ N <sub>RB</sub> - floor(N <sub>RB</sub> *0.2) | L <sub>CRB</sub> ≤ floor(N <sub>RB</sub> *0.2) | Region 1 |
|                        |                         | The RB allocation is in Region 2 allocation for all other allocations which are not a Region1 or Region3 allocation.   |                                                | Region 2 |
|                        |                         | floor(N <sub>RB</sub> /3.5) ≤ RB <sub>start</sub> ≤ N <sub>RB</sub> - floor(N <sub>RB</sub> /3.5) - L <sub>CRB</sub>   | L <sub>CRB</sub> ≤ ceil(N <sub>RB</sub> /3.5)  | Region 3 |

N<sub>RB</sub> is the maximum number of RBs for a given Channel bandwidth and sub-carrier spacing defined in Table 5.3.2-1 [3].

For the simultaneous PSFCH transmission when NS\_52 is indicated by the network or pre-configured radio parameters for NR V2X UE, the NR UE allow the follow A-MPR requirements

**Table 6.2E.3.3-2: A-MPR for simultaneous PSFCH by NS\_52**

| Channel Bandwidth [MHz] | Carrier frequency [MHz] | A-MPR (dB) |
|-------------------------|-------------------------|------------|
| 40 MHz                  | 5885                    | 23.5       |

For the S-SSB transmission when NS\_52 is indicated by the network or pre-configured radio parameters for NR V2X UE, the NR UE allow the follow A-MPR requirements

**Table 6.2E.3.2-3: A-MPR for S-SSB transmission by NS\_52**

| Carrier Frequency [MHz] | RB <sub>Start</sub> * 12*SCS [MHz] | A-MPR (dB) |
|-------------------------|------------------------------------|------------|
| 5885                    | ≤ 7                                | ≤ 16       |
|                         | > 7 and ≤ 12                       | ≤ 10.5     |
|                         | > 12 and ≤ 19                      | ≤ 4.0      |
|                         | > 19 and ≤ 25                      | ≤ 10.5     |
|                         | > 25                               | ≤ 16       |

#### 6.2E.3.4 A-MPR for V2X concurrent operation

For the inter-band concurrent NR V2X operation, the allowed additional maximum power reduction (A-MPR) for the maximum output power shall be applied per each component carrier. The A-MPR requirements in clause 6.2.3 apply for NR Uu operation in licensed band, and the A-MPR requirements in clause 6.2E.3.2 and 6.2E.3.3 apply for NR sidelink operation in Band n47.

For the intra-band concurrent NR V2X operation, the A-MPR requirements in [6.2E.3.4] apply for NR Uu and SL concurrent operation in the licensed band.

### 6.2E.4 Configured transmitted power for V2X

#### 6.2E.4.1 General

The NR V2X UE is allowed to set its configured maximum output power  $P_{\text{CMAX},f,c}$  for carrier  $f$  of serving cell  $c$  in each slot. The configured maximum output power  $P_{\text{CMAX},f,c}$  is set within the following bounds:

$$P_{\text{CMAX}_L,f,c} \leq P_{\text{CMAX},f,c} \leq P_{\text{CMAX}_H,f,c} \text{ with}$$

$$P_{\text{CMAX}_L,f,c} = \text{MIN} \{ P_{\text{EMAX},c}, P_{\text{PowerClass}, \text{V2X}} - \text{MAX}(\text{MAX}(\text{MPR}_c, \text{A-MPR}_c) + \Delta T_{\text{IB},c}, P\text{-MPR}_c), P_{\text{Regulatory},c} \}$$

$$P_{\text{CMAX}_H,f,c} = \text{MIN} \{ P_{\text{EMAX},c}, P_{\text{PowerClass}, \text{V2X}}, P_{\text{Regulatory},c} \}$$

where

- $P_{\text{CMAX},f,c}$  is configured for PSSCH\PSCCH, S-SSB and PSFCH, respectively;
- For the total transmitted power  $P_{\text{CMAX},\text{PSSCH/PSCCH}}$ ,  $P_{\text{EMAX},c}$  is the value given by IE *sl-maxTransPower*, defined by TS 38.331
- For the total transmitted power  $P_{\text{CMAX},\text{S-SSB}}$ , the  $P_{\text{CMAX}_L,f,c}$  and  $P_{\text{CMAX}_H,f,c}$  are defined as follows:

$$P_{\text{CMAX}_L,f,c} = \text{MIN} \{ P_{\text{PowerClass}, \text{V2X}} - \text{MAX}(\text{MAX}(\text{MPR}_c, \text{A-MPR}_c) + \Delta T_{\text{IB},c}, P\text{-MPR}_c), P_{\text{Regulatory},c} \}$$

$$P_{\text{CMAX}_H,f,c} = \text{MIN} \{ P_{\text{PowerClass}, \text{V2X}}, P_{\text{Regulatory},c} \}$$

- For the total transmitted power  $P_{\text{CMAX},\text{PSFCH}}$ ,  $P_{\text{EMAX},c}$  is the value given by IE *sl-maxTransPower* when single resource pool configured is transmitted at a given time and sum of the IEs *sl-maxTransPower* when multiple resource pools configured are transmitted at a given time, defined by TS 38.331.
- $P_{\text{PowerClass}, \text{V2X}}$  is the maximum UE power specified in Table 6.2E.1.1-1 without taking into account the tolerance specified in the Table 6.2E.1.1-1;

- $MPR_c$  and  $A-MPR_c$  for serving cell  $c$  are specified in clause 6.2E.2 and clause 6.2E.3 for PSSCH\PSCCH, S-SSB and PSFCH, respectively;
- $\Delta T_{IB,c}$ , and  $P-MPR_c$  are specified in clause 6.2.4
- $P_{Regulatory,c} = 10 - G_{post\ connector}$  dBm the V2X UE is within the protected zone [12] of CEN DSRC tolling system and operating in Band n47;  $P_{Regulatory,c} = 33 - G_{post\ connector}$  dBm otherwise.

The maximum output power  $P_{CMAX,PSSCH}$  and  $P_{CMAX,PSCCH}$  are derived from  $P_{CMAX,c}$  based on 0dB PSD offset between PSSCH and PSCCH.

For the measured configured maximum output power  $P_{UMAX,c}$  for NR V2X sidelink transmissions non-concurrent with NR uplink transmissions, the same requirement as in clause 6.2.4 shall be applied.

For NR V2X UE supporting SL MIMO or Tx Diversity, the transmitted power is configured per each UE.

For NR V2X UE with two transmit antenna connectors at the same time, the tolerance is specified in Table 6.2E.4.1-1.

**Table 6.2E.4.1-1:  $P_{CMAX,c}$  tolerance schemes for MIMO**

| $P_{CMAX,c}$<br>(dBm)      | Tolerance<br>$T_{LOW}(P_{CMAX\_L,c})$ (dB) | Tolerance<br>$T_{HIGH}(P_{CMAX\_H,c})$ (dB) |
|----------------------------|--------------------------------------------|---------------------------------------------|
| $P_{CMAX,c} = 26$          | 3.0                                        | 2.0                                         |
| $23 \leq P_{CMAX,c} < 26$  | 3.0                                        | 2.0                                         |
| $22 \leq P_{CMAX,c} < 23$  | 5.0                                        | 2.0                                         |
| $21 \leq P_{CMAX,c} < 22$  | 5.0                                        | 3.0                                         |
| $20 \leq P_{CMAX,c} < 21$  | 5.0                                        | 4.0                                         |
| $16 \leq P_{CMAX,c} < 20$  | 5.0                                        |                                             |
| $11 \leq P_{CMAX,c} < 16$  | 6.0                                        |                                             |
| $-40 \leq P_{CMAX,c} < 11$ | 7.0                                        |                                             |

#### 6.2E.4.2 Configured transmitted power for inter-band V2X concurrent operation

When a UE is configured for simultaneous NR V2X sidelink and NR uplink transmissions for inter-band concurrent operation, the UE is allowed to set its configured maximum output power  $P_{CMAX,c,NR}$  and  $P_{CMAX,c,V2X}$  for the configured NR uplink carrier and the configured NR V2X carrier, respectively, and its total configured maximum output power  $P_{CMAX,c}$ .

The configured maximum output power  $P_{CMAX,c,NR}(p)$  in slot  $p$  for the configured NR uplink carrier shall be set within the bounds:

$$P_{CMAX\_L,c,NR}(p) \leq P_{CMAX,c,NR}(p) \leq P_{CMAX\_H,c,NR}(p)$$

where  $P_{CMAX\_L,c,NR}$  and  $P_{CMAX\_H,c,NR}$  are the limit as specified in clause 6.2E.4.1.

The configured maximum output power  $P_{CMAX,c,V2X}(q)$  in slot  $q$  for the configured NR V2X carrier shall be set within the bounds:

$$P_{CMAX\_L,c,V2X}(q) \leq P_{CMAX,c,V2X}(q) \leq P_{CMAX\_H,c,V2X}(q)$$

where  $P_{CMAX\_H,c,V2X}$  is the limit as specified in clause 6.2E.4.

The total UE configured maximum output power  $P_{CMAX}(p,q)$  in a slot  $p$  of NR uplink carrier and a slot  $q$  of NR V2X sidelink that overlap in time shall be set within the following bounds for synchronous and asynchronous operation unless stated otherwise:

$$P_{CMAX\_L}(p,q) \leq P_{CMAX}(p,q) \leq P_{CMAX\_H}(p,q)$$

with

$$P_{CMAX\_L}(p,q) = P_{CMAX\_L,c,NR}(p)$$

$$P_{CMAX\_H}(p,q) = 10 \log_{10} [P_{CMAX\_H,c,NR}(p) + P_{CMAX\_H,c,V2X}(q)]$$

where  $p_{CMAX\_H,c,V2X}$  and  $p_{CMAX\_H,c,NR}$  are the limits  $P_{CMAX\_H,c,V2X}(q)$  and  $P_{CMAX\_H,c,NR}(p)$  expressed in linear scale.



The measured total maximum output power  $P_{\text{UMAX}}$  over both the NR uplink and NR V2X carriers is

$$P_{\text{UMAX}} = 10 \log_{10} [p_{\text{UMAX},c,\text{NR}} + p_{\text{UMAX},c,\text{V2X}}],$$

where  $p_{\text{UMAX},c,\text{NR}}$  denotes the measured output power of serving cell  $c$  for the configured NR uplink carrier, and  $p_{\text{UMAX},c,\text{V2X}}$  denotes the measured output power for the configured NR V2X carrier expressed in linear scale.

When a UE is configured for synchronous V2X sidelink and uplink transmissions,

$$P_{\text{CMAX\_L}}(p, q) - T_{\text{LOW}}(P_{\text{CMAX\_L}}(p, q)) \leq P_{\text{UMAX}} \leq P_{\text{CMAX\_H}}(p, q) + T_{\text{HIGH}}(P_{\text{CMAX\_H}}(p, q))$$

where  $P_{\text{CMAX\_L}}(p, q)$  and  $P_{\text{CMAX\_H}}(p, q)$  are the limits for the pair  $(p, q)$  and with the tolerances  $T_{\text{LOW}}(P_{\text{CMAX}})$  and  $T_{\text{HIGH}}(P_{\text{CMAX}})$  for applicable values of  $P_{\text{CMAX}}$  specified in Table 6.2E.4.1-1..  $P_{\text{CMAX\_L}}$  may be modified for any overlapping portion of slots  $(p, q)$  and  $(p + 1, q + 1)$ .

### 6.2E.4.3 Configured transmitted power for intra-band V2X concurrent operation

For intra-band concurrent operation, if transmission of Uu and SL does not overlap in time, the configured output power  $P_{\text{CMAX},c}$  specified in clause 6.2E.4.1 and 6.2.4 apply for SL and Uu transmission respectively; otherwise, if transmission of Uu and SL overlap in time, the configured maximum output power  $P_{\text{CMAX},c}$  on serving cell  $c$  for SL and Uu shall be set as specified in clause 6.2E.4.1 and in clause 6.2.4, but with  $\text{MPR}_c = \text{MPR}$  and  $\text{A-MPR}_c = \text{A-MPR}$  with MPR and A-MPR as determined by subclause 6.2E.2.3 for both PC3 and PC2 and subclause 6.2E.3.4, respectively. There is one power management term for the UE, denoted P-MPR, and  $\text{P-MPR}_c = \text{P-MPR}$ .

The total configured maximum output power  $P_{\text{CMAX}}$  shall be set within the following bounds:

$$P_{\text{CMAX\_L}} \leq P_{\text{CMAX}} \leq P_{\text{CMAX\_H}}$$

For intra-band concurrent operation when same slot pattern is used in all aggregated serving cells,

$$P_{\text{CMAX\_L}} = \text{MIN}\{10 \log_{10} \sum p_{\text{EMAX},c} - \Delta T_C, P_{\text{PowerClass,concurrent}} - \text{MAX}(\text{MAX}(\text{MPR}, \text{A-MPR}) + \Delta T_{\text{IB},c} + \Delta T_C, \text{P-MPR})\}$$

$$P_{\text{CMAX\_H}} = \text{MIN}\{10 \log_{10} \sum p_{\text{EMAX},c}, P_{\text{PowerClass,concurrent}}\}$$

where

- $p_{\text{EMAX},c}$  is the linear value of  $P_{\text{EMAX},c}$  which is given by IE *P-Max* for Uu serving cell  $c$  or by IE *sl-MaxTransPower* for SL defined in [7];
- $P_{\text{PowerClass,concurrent}}$  is the maximum UE power specified in Table 6.2E.1.2-2 without taking into account the tolerance;
- MPR and A-MPR are specified in clause 6.2E.2 and 6.2E.3, respectively;
- $\Delta T_{\text{IB},c}$  is the additional tolerance for serving cell  $c$  as specified in clause 6.2E.4.3
- P-MPR is the power management term for the UE;
- $\Delta T_C$  is the highest value  $\Delta T_{C,c}$  among all serving cells  $c$ ;

For intra-band concurrent operation, when at least one different numerology/slot pattern is used in aggregated cells, the UE is allowed to set its configured maximum output power  $P_{\text{CMAX},c(i),i}$  for serving cell  $c(i)$  of slot numerology type  $i$ , and its total configured maximum output power  $P_{\text{CMAX}}$ .

The configured maximum output power  $P_{\text{CMAX},c(i),i}(p)$  in slot  $p$  of serving cell  $c(i)$  on slot numerology type  $i$  shall be set within the following bounds:

$$P_{\text{CMAX\_L},f,c(i),i}(p) \leq P_{\text{CMAX},f,c(i),i}(p) \leq P_{\text{CMAX\_H},f,c(i),i}(p)$$

where  $P_{\text{CMAX\_L},f,c(i),i}(p)$  and  $P_{\text{CMAX\_H},f,c(i),i}(p)$  are the limits for a serving cell  $c(i)$  of slot numerology type  $i$  as specified in clause 6.2.4.

The total UE configured maximum output power  $P_{\text{CMAX}}(p, q)$  in a slot  $p$  of slot numerology or symbol pattern  $i$ , and a slot  $q$  of slot numerology or symbol pattern  $j$  that overlap in time shall be set within the following bounds unless stated otherwise:

$$P_{\text{CMAX\_L}}(p,q) \leq P_{\text{CMAX}}(p,q) \leq P_{\text{CMAX\_H}}(p,q)$$

When slots  $p$  and  $q$  have different transmissions lengths and belong to different cells on same band for intra-band operation:

$$P_{\text{CMAX\_L}}(p,q) = \text{MIN} \{ 10 \log_{10} [P_{\text{CMAX\_L,f,c(i),Uu,i}}(p) + P_{\text{CMAX\_L,f,c(i),V2X,j}}(q)], P_{\text{PowerClass,concurrent}} \}$$

$$P_{\text{CMAX\_H}}(p,q) = \text{MIN} \{ 10 \log_{10} [P_{\text{CMAX\_H,f,c(i),Uu,i}}(p) + P_{\text{CMAX\_H,f,c(i),V2X,j}}(q)], P_{\text{PowerClass,concurrent}} \}$$

where  $P_{\text{CMAX\_L,f,c(i),Uu,i}}$  and  $P_{\text{CMAX\_H,f,c(i),Uu,i}}$  are the respective limits  $P_{\text{CMAX\_L,f,c(i),Uu,i}}$  and  $P_{\text{CMAX\_H,f,c(i),Uu,i}}$  expressed in linear scale.

$T_{\text{REF}}$  and  $T_{\text{eval}}$  are specified in Table 6.2E.4.3-1 when same and different slot patterns are used in aggregated carriers. For each  $T_{\text{REF}}$ , the  $P_{\text{CMAX\_L}}$  is evaluated per  $T_{\text{eval}}$  and given by the minimum value taken over the transmission(s) within the  $T_{\text{eval}}$ ; the minimum  $P_{\text{CMAX\_L}}$  over the one or more  $T_{\text{eval}}$  is then applied for the entire  $T_{\text{REF}}$ .  $P_{\text{PowerClass,Concurrent}}$  shall not be exceeded by the UE during any period of time.

**Table 6.2E.4.3-1:  $P_{\text{CMAX}}$  evaluation window for different slot and channel durations**

| $T_{\text{REF}}$                                                  | $T_{\text{eval}}$       | $T_{\text{eval}}$ with frequency hopping                             |
|-------------------------------------------------------------------|-------------------------|----------------------------------------------------------------------|
| $T_{\text{REF}}$ of largest slot duration over both UL and SL CCs | Physical channel length | $\text{Min}(T_{\text{no\_hopping}}, \text{Physical Channel Length})$ |

The measured maximum output power  $P_{\text{UMAX}}$  over all serving cells with same slot pattern shall be within the following range:

$$P_{\text{CMAX\_L}} - \text{MAX}\{T_{\text{L}}, T_{\text{LOW}}(P_{\text{CMAX\_L}})\} \leq P_{\text{UMAX}} \leq P_{\text{CMAX\_H}} + T_{\text{HIGH}}(P_{\text{CMAX\_H}})$$

$$P_{\text{UMAX}} = 10 \log_{10} \sum p_{\text{UMAX},c}$$

where  $p_{\text{UMAX},c}$  denotes the measured maximum output power for serving cell  $c$  expressed in linear scale. The tolerances  $T_{\text{LOW}}(P_{\text{CMAX}})$  and  $T_{\text{HIGH}}(P_{\text{CMAX}})$  for applicable values of  $P_{\text{CMAX}}$  are specified in Table 6.2E.4.3-2. The tolerance  $T_{\text{L}}$  is the absolute value of the lower tolerance for applicable NR V2X concurrent operation configuration as specified in Table 6.2 E.1.2-2 for intra-band NR V2X concurrent operation.

The measured maximum output power  $P_{\text{UMAX}}$  over all serving cells, when at least one slot has a different transmission numerology or slot pattern, shall be within the following range:

$$P'_{\text{CMAX\_L}} - \text{MAX}\{T_{\text{L}}, T_{\text{LOW}}(P'_{\text{CMAX\_L}})\} \leq P'_{\text{UMAX}} \leq P'_{\text{CMAX\_H}} + T_{\text{HIGH}}(P'_{\text{CMAX\_H}})$$

$$P'_{\text{UMAX}} = 10 \log_{10} \sum p'_{\text{UMAX},c}$$

where  $p'_{\text{UMAX},c}$  denotes the average measured maximum output power for serving cell  $c$  expressed in linear scale over  $T_{\text{REF}}$ . The tolerances  $T_{\text{LOW}}(P'_{\text{CMAX}})$  and  $T_{\text{HIGH}}(P'_{\text{CMAX}})$  for applicable values of  $P'_{\text{CMAX}}$  are specified in Table 6.2E.4.3-2. The tolerance  $T_{\text{L}}$  is the absolute value of the lower tolerance for applicable NR V2X concurrent operation configuration as specified in Table 6.2E.1.2-2 for intra-band NR V2X concurrent operation.

where:

$$P'_{\text{CMAX\_L}} = \text{MIN}\{ \text{MIN} \{ 10 \log_{10} \sum (P_{\text{CMAX\_L,f,c(i),i}}), P_{\text{PowerClass,concurrent}} \} \text{ over all overlapping slots in } T_{\text{REF}} \}$$

$$P'_{\text{CMAX\_H}} = \text{MAX}\{ \text{MIN} \{ 10 \log_{10} \sum p_{\text{EMAX},c}, P_{\text{PowerClass,concurrent}} \} \text{ over all overlapping slots in } T_{\text{REF}} \}$$

**Table 6.2E.4.3-2:  $P_{\text{CMAX}}$  tolerance for SL intra-band concurrent operation**

| $P_{\text{CMAX}}$<br>(dBm)        | Tolerance<br>$T_{\text{LOW}}(P_{\text{CMAX}})$<br>(dB) | Tolerance<br>$T_{\text{HIGH}}(P_{\text{CMAX}})$<br>(dB) |
|-----------------------------------|--------------------------------------------------------|---------------------------------------------------------|
| $26 \leq P_{\text{CMAX}} < 23$    | 3                                                      | 2                                                       |
| $21 \leq P_{\text{CMAX}} \leq 23$ | 2.0                                                    |                                                         |
| $20 \leq P_{\text{CMAX}} < 21$    | 2.5                                                    |                                                         |
| $19 \leq P_{\text{CMAX}} < 20$    | 3.5                                                    |                                                         |
| $18 \leq P_{\text{CMAX}} < 19$    | 4.0                                                    |                                                         |
| $13 \leq P_{\text{CMAX}} < 18$    | 5.0                                                    |                                                         |

|                                |     |
|--------------------------------|-----|
| $8 \leq P_{\text{CMAX}} < 13$  | 6.0 |
| $-40 \leq P_{\text{CMAX}} < 8$ | 7.0 |

A UE supporting sidelink operation can be configured by higher layers with one or more sidelink resource pools. A sidelink resource pool can be associated with either sidelink resource allocation mode 1 or sidelink resource allocation mode 2.

For sidelink resource allocation in either mode 1 or mode 2, if UE is in RRC\_CONNECTED state, and the preparation procedure time for transmission of sidelink physical channel is available before  $T_{\text{proc},2}$  of PUSCH preparation procedure time, for transmission of Uu and SL not overlap in time, the configured output power  $P_{\text{CMAX},c}$  specified in clause 6.2E.4.1 and in clause 6.2.4 apply for SL and Uu transmission respectively, otherwise, the configured maximum output power  $P_{\text{CMAX}}$  specified in this clause shall apply.

For sidelink resource allocation mode 2, if UE is in RRC\_IDLE state, sidelink transmission is based on pre-configured sidelink resource pool, the UE configured output power is determined by sidelink only, where the configured output power specified in clause 6.2E.4.1 apply.

For sidelink resource allocation mode 2, if UE is in RRC\_INACTIVE state, and Uu does not support SDT, the configured output power specified in clause 6.2E.4.1 apply, otherwise, the configured maximum output power  $P_{\text{CMAX}}$  in this clause shall apply.

## 6.2F Transmitter power for shared spectrum channel access

### 6.2F.1 UE maximum output power

The following UE Power Classes define the maximum output power for any transmission bandwidth within the channel bandwidth of shared spectrum channel access carrier unless otherwise stated. The period of measurement shall be at least one sub frame (1ms).

**Table 6.2F.1-1: UE Power Class**

| NR band                                                                                                     | Class 1 (dBm) | Tolerance (dB) | Class 2 (dBm) | Tolerance (dB) | Class 3 (dBm) | Tolerance (dB) | Class 5 (dBm) | Tolerance (dB) |
|-------------------------------------------------------------------------------------------------------------|---------------|----------------|---------------|----------------|---------------|----------------|---------------|----------------|
| n46                                                                                                         |               |                |               |                |               |                | 20            | +2/-3          |
| n96                                                                                                         |               |                |               |                |               |                | 20            | +2/-3          |
| n102                                                                                                        |               |                |               |                |               |                | 20            | +2/-3          |
| NOTE 1: $P_{\text{PowerClass}}$ is the maximum UE power specified without taking into account the tolerance |               |                |               |                |               |                |               |                |
| NOTE 2: Power class 5 is default power class unless otherwise stated.                                       |               |                |               |                |               |                |               |                |

The UE operating shall meet the following additional requirements for maximum mean transmission power density specified in Table 6.2F.1-2 when NS is signaled and when transmission overlaps with any portion of the specified frequency range. In case transmission overlaps multiple frequency ranges, the lowest power density requirement applies.

**Table 6.2F.1-2: Additional requirements for transmit power density**

| NR Band | NS value | Channel bandwidth (MHz) | Frequency range (MHz) | Maximum mean power density (dBm/MHz) |
|---------|----------|-------------------------|-----------------------|--------------------------------------|
| n46     | NS_28    | 20, 40, 60, 80          | 5150 – 5350           | 10                                   |
|         |          |                         | 5470 – 5725           |                                      |
|         | NS_29    | 20                      | 5170 – 5330           | 10                                   |
|         |          |                         | 5490 – 5730           |                                      |
|         |          | 40                      | 5170 – 5330           | 7                                    |
|         |          |                         | 5490 – 5730           |                                      |
|         |          | 60, 80                  | 5170 – 5330           | 4                                    |
|         |          |                         | 5490 – 5730           |                                      |
|         | NS_30    | 20, 40, 60, 80          | 5150 – 5350           | 11                                   |
|         |          |                         | 5470 – 5725           |                                      |

|      |       |                |             |    |
|------|-------|----------------|-------------|----|
|      | NS_31 | 20             | 5150 – 5230 | 10 |
|      |       |                | 5250 – 5350 |    |
|      |       |                | 5470 – 5725 |    |
|      |       |                | 5725 – 5850 |    |
|      |       | 40             | 5230 – 5250 | 4  |
|      |       |                | 5150 – 5230 |    |
|      |       |                | 5250 – 5350 |    |
|      |       |                | 5470 – 5725 |    |
|      |       | 60, 80         | 5725 – 5850 | 4  |
|      |       |                | 5230 – 5250 |    |
|      |       |                | 5150 – 5230 |    |
|      |       |                | 5250 – 5350 |    |
| n96  | NS_53 | 20, 40, 60, 80 | 5925 – 7125 | -1 |
|      | NS_54 | 20, 40, 60, 80 | 5925 – 6425 | 17 |
|      |       |                | 6525 – 6875 |    |
|      | NS_59 | 20, 40, 60, 80 | 5925 – 7125 | 5  |
|      | NS_60 | 20, 40, 60, 80 | 5925 – 7125 | 2  |
|      | NS_61 | 20, 40, 60, 80 | 5925 – 6425 | 1  |
| n102 | NS_58 | 20, 40, 60, 80 | 5945 – 6425 | 10 |

## 6.2F.1A UE maximum output power for CA

### 6.2F.1A.1 UE maximum output power for inter-band CA

For inter-band carrier aggregation with one uplink carrier assigned to one NR band, the transmitter power requirements in clause 6.2 apply.

For inter-band carrier aggregation with uplink assigned to two bands and including one of the bands listed in Table 6.2F.1-1, the requirements in clause 6.2.2 apply for the NR uplink carrier and clause 6.2F.2 for the carrier operating with shared spectrum access.

For inter-band carrier aggregation with uplink assigned to two NR bands and including one of the bands listed in Table 6.2F.1-1, UE maximum output power shall be measured over all component carriers from different bands. If each band has separate antenna connectors, maximum output power is defined as the sum of maximum output power from each UE antenna connector. The period of measurement shall be at least one sub frame (1 ms). The maximum output power is specified in Table 6.2A.1.3-1.

**Table 6.2F.1A.1-1 void**

### 6.2F.1A.2 UE maximum output power for intra-band contiguous CA

For uplink intra-band contiguous carrier aggregation, the maximum output power is specified in Table 6.2F.1A.2-1. For downlink intra-band contiguous carrier aggregation with a single uplink component carrier configured in the NR-U band, the maximum output power is specified in Table 6.2F.1-1 for power class 5.

**Table 6.2F.1A.2-1: UE Power Class for intra-band contiguous CA**

| NR CA Configuration                                                                                   | Class 1 (dBm) | Tolerance (dB) | Class 2 (dBm) | Tolerance (dB) | Class 3 (dBm) | Tolerance (dB) | Class 5 (dBm) | Tolerance (dB) |
|-------------------------------------------------------------------------------------------------------|---------------|----------------|---------------|----------------|---------------|----------------|---------------|----------------|
| CA_n96B                                                                                               |               |                |               |                |               |                | 20            | +2/-3          |
| CA_n96C                                                                                               |               |                |               |                |               |                | 20            | +2/-3          |
| NOTE 1: $P_{PowerClass}$ is the maximum UE power specified without taking into account the tolerance. |               |                |               |                |               |                |               |                |
| NOTE 2: Power class 5 is default power class unless otherwise stated.                                 |               |                |               |                |               |                |               |                |

## 6.2F.1B UE maximum output power for NR-DC

For inter-band NR-DC with uplink assigned to two bands and including one of the bands listed in Table 6.2F.1-1, the requirements in clause 6.2.2 apply for the NR uplink carrier and clause 6.2F.2 for the carrier operating with shared spectrum access.

For inter-band NR-DC with uplink assigned to two bands and including one of the bands listed in Table 6.2F.1-1, the UE maximum output power shall be measured over all component carriers from different bands. If each band has separate antenna connectors, the maximum output power is defined as the sum of maximum output power from each UE antenna connector. The period of measurement shall be at least one sub frame (1 ms). The maximum output power is specified in Table 6.2B.1.3-1.

## 6.2F.1D UE maximum output power for UL MIMO

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the maximum output power for any transmission bandwidth within the channel bandwidth is specified in Table 6.2F.1D-1. The requirements shall be met with the UL MIMO configurations specified in Table 6.2D.1-2. For UE supporting UL MIMO, the maximum output power is defined as the sum of the maximum output power from both UE antenna connectors. The period of measurement shall be at least one sub frame (1 ms).

The requirements shall be met with the UL MIMO configurations of using 2-layer UL MIMO transmission with codebook of  $\frac{1}{\sqrt{2}} \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ . DCI Format for UE configured in PUSCH transmission mode for uplink single-user MIMO shall be used.

**Table 6.2F.1D-1 UE Power Class for UL MIMO in closed loop spatial multiplexing scheme**

| NR band | Class 1 (dBm) | Tolerance (dB) | Class 2 (dBm) | Tolerance (dB) | Class 3 (dBm) | Tolerance (dB) | Class 5 (dBm) | Tolerance (dB) |
|---------|---------------|----------------|---------------|----------------|---------------|----------------|---------------|----------------|
| n46     |               |                |               |                |               |                | 20            | +2/-3          |
| n96     |               |                |               |                |               |                | 20            | +2/-3          |
| n102    |               |                |               |                |               |                | 20            | +2/-3          |

NOTE 1: Power class 5 is default power class unless otherwise stated.

For UE supporting uplink full power transmission (ULFPTx) for UL MIMO, the maximum output power requirements specified in Table 6.2F.1D-1 shall be met with the PUSCH configurations specified in Table 6.2D.1-3, based upon UE's support of uplink full power transmission mode.

## 6.2F.2 UE maximum output power reduction

For UE maximum output power reduction, the general requirements of clause 6.2.2 do not apply but instead the UE is allowed to reduce the maximum output power due to higher order modulations and transmit bandwidth configurations for power class 5 according to Table 6.2F.2-1 and Table 6.2F.2-2.

Unless otherwise specified, pi/2 BPSK in this clause refers to both variants of pi/2 BPSK referenced in table 6.2.2-1.

**Table 6.2F.2-1 Maximum power reduction (MPR) for shared spectrum access UE power class 5**

| Pre-coding | Modulation             | RB Allocation          |                           |                                             |
|------------|------------------------|------------------------|---------------------------|---------------------------------------------|
|            |                        | Full <sup>2</sup> (dB) | Partial <sup>3</sup> (dB) | Exception for 100MHz Full <sup>5</sup> (dB) |
| DFT-s-OFDM | Pi/2 BPSK <sup>4</sup> | ≤ 1.5                  | ≤ 2.5                     |                                             |
|            | QPSK                   | ≤ 1.5                  | ≤ 2.5                     |                                             |
|            | 16 QAM                 | ≤ 2.0                  | ≤ 3.0                     |                                             |
|            | 64 QAM                 | ≤ 3.5                  | ≤ 4.5                     |                                             |

|                                                                                                                                                                                                                                     |         |            |            |            |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------|------------|------------|
| CP-OFDM                                                                                                                                                                                                                             | 256 QAM | $\leq 5.0$ | $\leq 5.5$ |            |
|                                                                                                                                                                                                                                     | QPSK    | $\leq 3.5$ | $\leq 3.5$ | $\leq 4.5$ |
|                                                                                                                                                                                                                                     | 16 QAM  | $\leq 4.0$ | $\leq 4.0$ | $\leq 4.5$ |
|                                                                                                                                                                                                                                     | 64 QAM  | $\leq 5.5$ | $\leq 5.5$ |            |
|                                                                                                                                                                                                                                     | 256 QAM | $\leq 7.0$ | $\leq 7.0$ |            |
| NOTE 1: The MPR shall apply to all SCS in all active 20 MHz sub-bands contiguously allocated in the channel. The MPR applies to interlaced allocations with uplink resource allocation type 2 as specified in TS 38.214 [10].       |         |            |            |            |
| NOTE 2: Full RB allocation MPR applies when all RB's in a 20 MHz channel or all RB's in all sub-bands for wideband operation are fully allocated and sub-bands are transmitted according to configuration A in Table 6.2F.2-2.      |         |            |            |            |
| NOTE 3: Partial RB allocation MPR applies when one or more RB's in one or more sub-bands are not allocated or when the transmitted sub-bands for wideband operation are transmitted according to configuration B in Table 6.2F.2-2. |         |            |            |            |
| NOTE 4: Applicable to Pi/2-BPSK modulation when IE powerBoostPi2BPSK is set to 0.                                                                                                                                                   |         |            |            |            |
| NOTE 5: Exception for 100MHz Full RB allocation MPR applies when all RB's in all sub-bands for 100MHz wideband operation are fully allocated and sub-bands are transmitted according to configuration B in Table 6.2F.2-2.          |         |            |            |            |

Table 6.2F.2-2 MPR mapping for wideband operation

| Wideband operation<br>channel bandwidth<br>(MHz)                                                                                                                                                                                                                                                                   | Sub-band configuration                                                      |                            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|----------------------------|
|                                                                                                                                                                                                                                                                                                                    | A                                                                           | B                          |
| 40                                                                                                                                                                                                                                                                                                                 | 11                                                                          | 10, 01                     |
| 60                                                                                                                                                                                                                                                                                                                 | 111, 011, 110, 001, 010, 100                                                | None                       |
| 80                                                                                                                                                                                                                                                                                                                 | 1111, 0111, 1110, 0110, 0001, 1000                                          | 1100, 0011, 0100, 0010     |
| 100                                                                                                                                                                                                                                                                                                                | 11111, 01111, 11110, 01110, 00100, 00110, 01100, 01000, 00010, 10000, 00001 | 00111, 11100, 00011, 11000 |
| NOTE 1: The sub-band configuration is represented as a bitmap where '1' indicates that a sub-band is transmitted and '0' indicates a sub-band is not transmitted. The bitmap is ordered with MSB mapped to the lowest frequency sub-band and LSB mapped to highest frequency sub-band within the wideband channel. |                                                                             |                            |
| NOTE 2: Void.                                                                                                                                                                                                                                                                                                      |                                                                             |                            |

For the UE maximum output power modified by MPR, the power limits specified in clause 6.2F.4 apply.

## 6.2F.2A UE maximum output power reduction for CA

### 6.2F.2A.1 UE maximum output power reduction for inter-band CA

For inter-band carrier aggregation with uplink assigned to two bands and including one of the bands listed in Table 6.2F.1-1, the requirements in clause 6.2.2 apply for the NR uplink carrier and clause 6.2F.2 for the carrier operating with shared spectrum access.

When inter-band carrier aggregation is configured with intra-band contiguous carrier aggregation in one of the bands, the requirements in clause 6.2A.2 apply for the NR uplink contiguous carrier aggregation and 6.2F.2A.2 apply for the shared spectrum band.

### 6.2F.2A.2 UE maximum output power reduction for intra-band contiguous CA

For intra-band contiguous carrier aggregation, the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2A.1.1-1 with contiguous RB allocation is specified in Table 6.2F.2A.2-1 and Table 6.2F.2A.2-2 for UE power class 5 CA bandwidth classes B and C. For UE maximum output power reduction, the general requirements of clause 6.2.2 do not apply but instead the UE is allowed to reduce the maximum output power due to higher order modulations and transmit bandwidth configurations for power class 5 according to Table 6.2F.2A.2-1 and Table 6.2F.2A.2-2.

**Table 6.2F.2A.2-1 Maximum power reduction (MPR) for power class 5 shared spectrum access intra-band contiguous CA for bandwidth class B and class C.**

| Pre-coding                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Modulation             | RB Allocation          |                           |                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|------------------------|---------------------------|--------------------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                        | Full <sup>2</sup> (dB) | Partial <sup>3</sup> (dB) | Exception for Full <sup>5</sup> (dB) |
| DFT-s-OFDM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Pi/2 BPSK <sup>4</sup> | ≤ [3.0]                |                           | ≤ [4.0]                              |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | QPSK                   | ≤ [3.0]                |                           | ≤ [4.0]                              |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 16 QAM                 | ≤ [3.5]                |                           | ≤ [4.5]                              |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 64 QAM                 | ≤ [4.5]                |                           | ≤ [5.0]                              |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 256 QAM                | ≤ [6.0]                |                           | ≤ [6.0]                              |
| CP-OFDM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | QPSK                   | ≤ [4.0]                |                           | ≤ [5.5]                              |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 16 QAM                 | ≤ [4.5]                |                           | ≤ [6.0]                              |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 64 QAM                 | ≤ [6.0]                |                           | ≤ [6.5]                              |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 256 QAM                | ≤ [7.0]                |                           | ≤ [7.0]                              |
| <p>NOTE 1: The MPR shall apply to all SCS in all active 20 MHz sub-bands contiguously allocated in the channel. The MPR applies to interleaved allocations with uplink resource allocation type 2 as specified in TS 38.214 [10].</p> <p>NOTE 2: Full RB allocation MPR applies when all RB's in a 20 MHz channel or all RB's in all sub-bands for wideband operation are fully allocated and sub-bands are transmitted according to configuration A in Table 6.2F.2A.2-2.</p> <p>NOTE 3: Partial RB allocation MPR applies when one or more RB's in one or more sub-bands are not allocated and sub-bands are transmitted according to configuration A in Table 6.2F.2A.2-2.</p> <p>NOTE 4: Applicable to Pi/2-BPSK modulation when IE powerBoostPi2BPSK is set to 0.</p> <p>NOTE 5: Exception for Full RB allocation MPR applies when all RB's in a 20 MHz channel or all RB's in all sub-bands for wideband operation are fully allocated and sub-bands are transmitted according to configuration B in Table 6.2F.2A.2-2.</p> |                        |                        |                           |                                      |

**Table 6.2F.2A.2-2 MPR mapping for intra-band CA wideband operation**

| Wideband operation channel bandwidth (MHz) | Sub-band configuration [CC1-CC2]                                                                                                      |                                                                                |
|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
|                                            | A                                                                                                                                     | B                                                                              |
| 20+20                                      | 1-1                                                                                                                                   | 1-0, 0-1                                                                       |
| 20+40                                      | 1-11, 1-10, 0-01, 0-10, 0-11, 1-00                                                                                                    | None                                                                           |
| 20+60                                      | 1-111, 1-110, 0-111, 0-110, 1-000, 0-001                                                                                              | 0-010, 0-100, 0-011, 1-100                                                     |
| 20+80                                      | 1-1111, 1-1110, 0-1111, 0-1110, 0-1100, 0-0100, 0-0111, 1-1000, 0-0011, 0-1000, 0-0010, 1-0000, 0-0001                                | 1-1100, 0-0111                                                                 |
| 40+20                                      | 11-1, 01-1, 11-0, 00-1, 01-0, 01-1, 10-0                                                                                              | None                                                                           |
| 40+40                                      | 11-11, 11-10, 01-11, 01-10, 10-00, 00-01                                                                                              | 00-10, 01-00, 00-11, 11-00                                                     |
| 40+60                                      | 11-111, 11-110, 01-111, 01-110, 01-100, 00-100, 00-111, 11-000, 00-011, 01-000, 00-010, 10-000, 00-001                                | 11-100, 00-111                                                                 |
| 40+80                                      | 11-1111, 11-1110, 01-1111, 01-1110, 11-1100, 00-1111, 01-1100, 00-1110, 00-1100, 11-0000, 00-0011, 01-0000, 00-0010, 10-0000, 00-0001 | 11-1000, 00-0111, 01-1000, 00-0110, 00-1000, 00-0100                           |
| 60+20                                      | 111-1, 111-0, 011-1, 011-0, 100-0, 000-1                                                                                              | 001-0, 010-0, 001-1, 110-0                                                     |
| 60+40                                      | 111-11, 111-10, 011-11, 011-10, 011-00, 001-00, 001-10, 001-11, 110-00, 000-11, 010-00, 000-10, 100-00, 000-01                        | 111-00, 001-11                                                                 |
| 60+60                                      | 111-111, 111-110, 011-111, 011-110, 111-100, 001-111, 011-100, 001-110, 001-100, 110-000, 000-011, 010-000, 000-010, 100-000, 000-001 | 111-000, 000-111, 011-000, 000-110, 001-000, 000-100                           |
| 60+80                                      | 111-1111, 111-1110, 111-1100, , 011-1111, 011-1110, 011-1100, 001-1111,                                                               | 111-1000, 000-1111, 011-1000, 000-1110, 111-0000, 000-0111, 011-0000, 000-0110 |

|                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                        |                                                                                                                                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                    | 001-1110, 001-1100, 001-1000, 000-1100, 000-1000, 000-1000, 001-0000, 000-0100, 110-0000, 000-0011, 010-0000, 000-0010, 100-0000, 000-0001                                                                                                                             |                                                                                                                                    |
| 80+20                                                                                                                                                                                                                                                                                                              | 1111-1, 1111-0, 0111-1, 0111-0, 0110-0, 0010-0, 0011-1, 1100-0, 0001-1, 0100-0, 0001-0, 1000-0, 0000-1                                                                                                                                                                 | 1110-0, 0011-1                                                                                                                     |
| 80+40                                                                                                                                                                                                                                                                                                              | 1111-11, 1111-10, 0111-11, 0111-10, 1111-00, 0011-11, 0111-00, 0011-10, 0011-00, 1100-00, 0000-11, 0100-00, 0000-10, 1000-00, 0000-01                                                                                                                                  | 1110-00, 0001-11, 0110-00, 0001-10, 0010-00, 0001-00                                                                               |
| 80+60                                                                                                                                                                                                                                                                                                              | 1111-111, 1111-110, 1111-100, 0111-111, 0111-110, 0111-100, 0011-111, 0011-110, 0011-100, 0011-000, 0001-100, 0001-000, 0001-000, 0010-000, 0000-100, 1100-000, 0000-011, 01000-00, 0000-010, 1000-000, 0000-001                                                       | 1111-000, 0001-111, 0111-000, 0001-110, 1110-000, 0000-111, 0110-000, 0000-110                                                     |
| 80+80                                                                                                                                                                                                                                                                                                              | 1111-1111, 1111-1110, 1111-1100, 0111-1111, 0111-1110, 0111-1100, 0011-1111, 0011-1110, 0011-1100, 0011-1000, 0001-1100, 0001-1000, 1110-0000, 0000-0111, 0110-0000, 0000-0110, 0010-0000, 0000-0100, 1100-0000, 0000-0011, 0100-0000, 0000-0010, 1000-0000, 0000-0001 | 1111-1000, 0001-1111, 0111-1000, 0001-1110, 1111-0000, 0000-1111, 0111-0000, 0000-1110, 0011-0000, 0000-1100, 0001-0000, 0000-1000 |
| NOTE 1: The sub-band configuration is represented as a bitmap where '1' indicates that a sub-band is transmitted and '0' indicates a sub-band is not transmitted. The bitmap is ordered with MSB mapped to the lowest frequency sub-band and LSB mapped to highest frequency sub-band within the wideband channel. |                                                                                                                                                                                                                                                                        |                                                                                                                                    |

## 6.2F.2D UE maximum output power reduction for UL MIMO

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2F.1D-1 is specified in Table 6.2F.2-1. The requirements shall be met with UL MIMO configurations defined in Table 6.2D.1-2. For UE supporting UL MIMO, the maximum output power is defined as the sum of the maximum output power from both UE antenna connectors.

For UE supporting uplink full power transmission (ULFPTx) for UL MIMO, the allowed MPR for the maximum output power in Table 6.2F.1D-1 is specified in Table 6.2F.2-1 for power class 5, and the requirements shall be met with the PUSCH configurations specified in Table 6.2D.1-3, based upon UE's support of uplink full power transmission mode.

The same MPR requirements shall be applicable to UE with 1-layer UL MIMO transmission (either with or without

ULFPTx) as with the UL MIMO configurations of using 2-layer UL MIMO transmission with codebook of  $\frac{1}{\sqrt{2}} \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ .

For the UE maximum output power modified by MPR, the power limits specified in clause 6.2D.4 apply.

If UE is scheduled for single antenna-port PUSCH transmission by DCI format 0\_0 or by DCI format 0\_1 for single antenna port codebook based transmission, the requirements in clause 6.2F.2 apply for the power class as indicated by the *ue-PowerClass* field in capability signaling.

## 6.2F.3 UE additional maximum output power reduction

### 6.2F.3.1 General

Additional emission requirements can be signalled by the network. Each additional emission requirement is associated with a unique network signalling (NS) value indicated in RRC signalling by an NR frequency band number of the applicable operating band and an associated value in the field *additionalSpectrumEmission*. Throughout this specification, the notion of indication or signalling of an NS value refers to the corresponding indication of an NR frequency band number of the applicable operating band, the IE field *freqBandIndicatorNR* and an associated value of *additionalSpectrumEmission* in the relevant RRC information elements [7].



To meet the additional requirements, additional maximum power reduction (A-MPR) is allowed for the maximum output power as specified in Table 6.2F.1-1. Unless stated otherwise, the total reduction to UE maximum output power is  $\max(\text{MPR}, \text{A-MPR})$  where MPR is defined in clause 6.2F.2.

Table 6.2F.3.1-1 specifies the additional requirements with their associated network signalling values and the allowed A-MPR and applicable operating band(s) for each NS value. The mapping of NR frequency band numbers and values of the *additionalSpectrumEmission* to network signalling labels is specified in Table 6.2F.3.1-1A. The NS\_01 label with the field *additionalPmax* [7] absent is default for all NR bands.

**Table 6.2F.3.1-1: Additional maximum power reduction (A-MPR)**

| Network signalling label | Requirements (clause) | NR Band        | Channel bandwidth (MHz) | Resources blocks ( $N_{RB}$ ) | A-MPR (clause) |
|--------------------------|-----------------------|----------------|-------------------------|-------------------------------|----------------|
| NS_01                    |                       | n46, n96, n102 | 20, 40, 60, 80          |                               | N/A            |
| NS_28                    | 6.5F.3.3.1, 6.2F.1    | n46            | 20, 40, 60, 80          |                               | 6.2F.3.2       |
| NS_29                    | 6.5F.3.3.2, 6.2F.1    | n46            | 20, 40, 60, 80          |                               | 6.2F.3.3       |
| NS_30                    | 6.5F.3.3.3, 6.2F.1    | n46            | 20, 40, 60, 80          |                               | 6.2F.3.4       |
| NS_31                    | 6.5F.3.3.4, 6.2F.1    | n46            | 20, 40, 60, 80          |                               | 6.2F.3.5       |
| NS_53                    | 6.5F.3.3.5, 6.2F.1    | n96            | 20, 40, 60, 80          |                               | 6.2F.3.6       |
| NS_54                    | 6.5F.3.3.5, 6.2F.1    | n96            | 20, 40, 60, 80          |                               | 6.2F.3.7       |
| NS_58                    | 6.5F.3.3.6, 6.2F.1    | n102           | 20, 40, 60, 80          |                               | 6.2F.3.8       |
| NS_59                    | 6.2F.1                | n96            | 20, 40, 60, 80          |                               | 6.2F.3.9       |
| NS_60                    | 6.5F.3.3.5, 6.2F.1    | n96            | 20, 40, 60, 80          |                               | 6.2F.3.10      |
| NS_61                    | 6.5F.3.3.7, 6.2F.1    | n96            | 20, 40, 60, 80          |                               | 6.2F.3.11      |

NOTE 1: The A-MPR shall apply to all active 20 MHz sub-bands contiguously allocated in the channel.

**Table 6.2F.3.1-1A: Mapping of network signalling label**

| NR band | Value of <i>additionalSpectrumEmission</i> |       |       |       |       |       |   |   |
|---------|--------------------------------------------|-------|-------|-------|-------|-------|---|---|
|         | 0                                          | 1     | 2     | 3     | 4     | 5     | 6 | 7 |
| n46     | NS_01                                      | NS_28 | NS_29 | NS_30 | NS_31 |       |   |   |
| n96     | NS_01                                      | NS_53 | NS_54 | NS_59 | NS_60 | NS_61 |   |   |
| n102    | NS_01                                      | NS_58 |       |       |       |       |   |   |

NOTE: *additionalSpectrumEmission* corresponds to an information element of the same name defined in clause 6.3.2 of TS 38.331 [7].

### 6.2F.3.2 A-MPR for NS\_28

When "NS\_28" is indicated in the cell, the A-MPR is specified in Table 6.2F.3.2-1.

**Table 6.2F.3.2-1: A-MPR for NS\_28 power class 5**

| Pre-coding | Modulation | RB Allocation (Note 2) |              | RB Allocation (Note 3) |
|------------|------------|------------------------|--------------|------------------------|
|            |            | Full (dB)              | Partial (dB) | Full/Partial           |
| DFT-s-OFDM | QPSK       | ≤ 4.0                  | ≤ 6.0        | See Table 6.2F.2-1     |
|            | 16 QAM     | ≤ 4.5                  | ≤ 6.0        |                        |
|            | 64 QAM     | ≤ 4.5                  | ≤ 6.5        |                        |
|            | 256 QAM    | ≤ 5.5                  | ≤ 6.5        |                        |
| CP-OFDM    | QPSK       | ≤ 6.0                  | ≤ 7.0        |                        |
|            | 16 QAM     | ≤ 6.0                  | ≤ 7.5        |                        |
|            | 64 QAM     | ≤ 6.5                  | ≤ 7.5        |                        |
|            | 256 QAM    | ≤ 7.0                  | ≤ 7.5        |                        |

NOTE 1: Full allocation A-MPR applies when all RB's in a 20 MHz channel or all RB's in all sub-bands for wideband operation are fully allocated and all sub-bands are transmitted. Partial allocation A-MPR applies when one or more RB's in one or more sub-bands are not allocated or when not all transmitted sub-bands for wideband operation are transmitted.

NOTE 2: Applicable for 20 MHz channels centered at the nearest NR-ARFCN corresponding to 5160, 5340, 5480, and 5700 MHz, 40 MHz channels centered at the nearest NR-ARFCN corresponding to 5170, 5190, 5310, 5330, 5490, and

5510 MHz, 60 MHz channels centered at the nearest NR-ARFCN corresponding to 5180, 5200, 5220, 5280, 5300, 5320, 5500, 5520, 5540, 5680 MHz, and 80 MHz channels centered at the nearest NR-ARFCN corresponding to 5190, 5210, 5290, 5310, 5510, and 5530 MHz.

NOTE 3: Applicable for all valid channels other than those enumerated under NOTE 2.

### 6.2F.3.3 A-MPR for NS\_29

When "NS\_29" is indicated in the cell, the A-MPR is specified in Table 6.2F.3.3-1.

**Table 6.2F.3.3-1: A-MPR for NS\_29 power class 5**

| Pre-coding                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Modulation | Channel bandwidth (Sub-band allocation) / RB Allocation |           |              |                |              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------------------------------------------------------|-----------|--------------|----------------|--------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |            | 20 MHz                                                  | 40 MHz    |              | 60 MHz, 80 MHz |              |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |            | Full/Partial                                            | Full (dB) | Partial (dB) | Full (dB)      | Partial (dB) |
| DFT-s-OFDM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | QPSK       | See Table 6.2F.2-1                                      | ≤ 2.0     | ≤ 4.0        | ≤ 4.0          | ≤ 6.0        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 16 QAM     |                                                         | ≤ 2.5     | ≤ 4.0        | ≤ 4.0          | ≤ 6.0        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 64 QAM     |                                                         | ≤ 3.5     | ≤ 4.0        | ≤ 4.5          | ≤ 6.0        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 256 QAM    |                                                         | ≤ 5.0     | ≤ 5.5        | ≤ 5.5          | ≤ 6.0        |
| CP-OFDM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | QPSK       |                                                         | ≤ 3.5     | ≤ 4.5        | ≤ 4.0          | ≤ 6.0        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 16 QAM     |                                                         | ≤ 4.0     | ≤ 4.5        | ≤ 4.0          | ≤ 6.0        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 64 QAM     |                                                         | ≤ 5.5     | ≤ 5.0        | ≤ 5.5          | ≤ 6.5        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 256 QAM    |                                                         | ≤ 7.0     | ≤ 6.5        | ≤ 7.0          | ≤ 7.0        |
| NOTE 1: Full allocation A-MPR applies when all RB's in a 20 MHz channel or all RB's in all sub-bands for wideband operation are fully allocated and all sub-bands are transmitted. Partial allocation A-MPR applies when one or more RB's in one or more sub-bands are not allocated but when all sub-bands within the channel are transmitted. When not all sub-bands within the channel are transmitted, the A-MPR associated with the channel bandwidth according to the bandwidth of the contiguously transmitted sub-bands and according to the allocation type applies. |            |                                                         |           |              |                |              |

### 6.2F.3.4 A-MPR for NS\_30

When "NS\_30" is indicated in the cell, the A-MPR is specified in Table 6.2F.3.4-1.

**Table 6.2F.3.4-1: A-MPR for NS\_30 power class 5**

| Pre-coding                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Modulation | RB Allocation (Note 2) |              | RB Allocation (Note 3) |              | RB Allocation (Note 4) |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------------------|--------------|------------------------|--------------|------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            | Full (dB)              | Partial (dB) | Full (dB)              | Partial (dB) | Full/Partial           |
| DFT-s-OFDM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | QPSK       | ≤ 9.0                  | ≤ 15.0       | ≤ 2.5                  | ≤ 5.0        | See Table 6.2F.2-1     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 16 QAM     | ≤ 9.0                  | ≤ 15.5       | ≤ 3.0                  | ≤ 5.0        |                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 64 QAM     | ≤ 9.0                  | ≤ 15.5       | ≤ 4.5                  | ≤ 5.5        |                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 256 QAM    | ≤ 9.0                  | ≤ 16.0       | ≤ 5.5                  | ≤ 5.5        |                        |
| CP-OFDM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | QPSK       | ≤ 9.0                  | ≤ 14.0       | ≤ 4.0                  | ≤ 6.0        |                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 16 QAM     | ≤ 9.5                  | ≤ 14.5       | ≤ 4.0                  | ≤ 6.0        |                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 64 QAM     | ≤ 9.5                  | ≤ 15.0       | ≤ 5.5                  | ≤ 6.5        |                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 256 QAM    | ≤ 9.5                  | ≤ 15.0       | ≤ 7.0                  | ≤ 7.0        |                        |
| NOTE 1: Full allocation A-MPR applies when all RB's in a 20 MHz channel or all RB's in all sub-bands for wideband operation are fully allocated and all sub-bands are transmitted. Partial allocation A-MPR applies when one or more RB's in one or more sub-bands are not allocated or when not all transmitted sub-bands for wideband operation are transmitted.                                                                                                                         |            |                        |              |                        |              |                        |
| NOTE 2: Applicable for 20 MHz channels centered at the nearest NR-ARFCN corresponding to 5160, 5340, 5480, and 5700 MHz, 40 MHz channels centered at the nearest NR-ARFCN corresponding to 5170, 5190, 5310, 5330, 5490, and 5510 MHz, 60 MHz channels centered at the nearest NR-ARFCN corresponding to 5180, 5200, 5220, 5280, 5300, 5320, 5500, 5520, 5540, 5680 MHz, and 80 MHz channels centered at the nearest NR-ARFCN corresponding to 5190, 5210, 5290, 5310, 5510, and 5530 MHz. |            |                        |              |                        |              |                        |
| NOTE 3: Applicable for 20 MHz channels centered at the nearest NR-ARFCN corresponding to 5180 and 5320 MHz, and 40 MHz channels centered at the nearest NR-ARFCN corresponding to 5230 and 5270 MHz.                                                                                                                                                                                                                                                                                       |            |                        |              |                        |              |                        |
| NOTE 4: Applicable for all valid channels other than those enumerated under NOTE 2 and NOTE 3.                                                                                                                                                                                                                                                                                                                                                                                             |            |                        |              |                        |              |                        |

## 6.2F.3.5 A-MPR for NS\_31

When "NS\_31" is indicated in the cell, the A-MPR is specified in Table 6.2F.3.5-1.

Table 6.2F.3.5-1: A-MPR for NS\_31 power class 5

| Pre-coding                                                                                                                                                                                                                                                                                                                                                         | Modulation | RB Allocation (Note 2) | RB Allocation (Note 3) |              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------------------|------------------------|--------------|
|                                                                                                                                                                                                                                                                                                                                                                    |            | Full/Partial           | Full (dB)              | Partial (dB) |
| DFT-s-OFDM                                                                                                                                                                                                                                                                                                                                                         | QPSK       | See Table 6.2F.2-1     | ≤ 4.0                  | ≤ 6.5        |
|                                                                                                                                                                                                                                                                                                                                                                    | 16 QAM     |                        | ≤ 4.0                  | ≤ 6.5        |
|                                                                                                                                                                                                                                                                                                                                                                    | 64 QAM     |                        | ≤ 4.0                  | ≤ 6.5        |
|                                                                                                                                                                                                                                                                                                                                                                    | 256 QAM    |                        | ≤ 5.0                  | ≤ 6.5        |
| CP-OFDM                                                                                                                                                                                                                                                                                                                                                            | QPSK       |                        | ≤ 5.5                  | ≤ 6.5        |
|                                                                                                                                                                                                                                                                                                                                                                    | 16 QAM     |                        | ≤ 5.5                  | ≤ 7.0        |
|                                                                                                                                                                                                                                                                                                                                                                    | 64 QAM     |                        | ≤ 5.5                  | ≤ 7.0        |
|                                                                                                                                                                                                                                                                                                                                                                    | 256 QAM    |                        | ≤ 7.0                  | ≤ 7.0        |
| NOTE 1: Full allocation A-MPR applies when all RB's in a 20 MHz channel or all RB's in all sub-bands for wideband operation are fully allocated and all sub-bands are transmitted. Partial allocation A-MPR applies when one or more RB's in one or more sub-bands are not allocated or when not all transmitted sub-bands for wideband operation are transmitted. |            |                        |                        |              |
| NOTE 2: Applicable for 20 MHz channels centered at the nearest NR-ARFCN corresponding to 5180, 5200, 5220, 5280, 5300, 5320, 5500, 5520, 5540, 5560, 5580, 5600, 5620, 5640, 5660, 5680, 5745, 5765, 5785, and 5805 MHz.                                                                                                                                           |            |                        |                        |              |
| NOTE 3: Applicable for all valid channels and bandwidths other than those enumerated in NOTE 2.                                                                                                                                                                                                                                                                    |            |                        |                        |              |

## 6.2F.3.6 A-MPR for NS\_53

When "NS\_53" is indicated in the cell, the A-MPR is specified in Table 6.2F.3.6-1.

Table 6.2F.3.6-1: A-MPR for NS\_53 power class 5

| Pre-coding                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Modulation | Channel bandwidth (Sub-band allocation) / RB Allocation |              |           |              |           |              |           |              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------------------------------------------------------|--------------|-----------|--------------|-----------|--------------|-----------|--------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |            | 20 MHz                                                  |              | 40 MHz    |              | 60 MHz    |              | 80 MHz    |              |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |            | Full (dB)                                               | Partial (dB) | Full (dB) | Partial (dB) | Full (dB) | Partial (dB) | Full (dB) | Partial (dB) |
| DFT-s-OFDM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | QPSK       | ≤ 9.0                                                   | ≤ 12.0       | ≤ 6.5     | ≤ 8.5        | ≤ 4.5     | ≤ 6.5        | ≤ 3.0     | ≤ 5.5        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 16 QAM     | ≤ 9.0                                                   | ≤ 12.0       | ≤ 6.5     | ≤ 8.5        | ≤ 4.5     | ≤ 6.5        | ≤ 3.0     | ≤ 5.5        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 64 QAM     | ≤ 9.0                                                   | ≤ 12.0       | ≤ 6.5     | ≤ 8.5        | ≤ 4.5     | ≤ 6.5        | ≤ 4.0     | ≤ 5.5        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 256 QAM    | ≤ 9.0                                                   | ≤ 12.0       | ≤ 6.5     | ≤ 8.5        | ≤ 5.0     | ≤ 7.0        | ≤ 5.0     | ≤ 5.5        |
| CP-OFDM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | QPSK       | ≤ 9.0                                                   | ≤ 12.0       | ≤ 6.5     | ≤ 8.5        | ≤ 4.5     | ≤ 6.5        | ≤ 4.0     | ≤ 5.5        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 16 QAM     | ≤ 9.0                                                   | ≤ 12.0       | ≤ 6.5     | ≤ 8.5        | ≤ 4.5     | ≤ 6.5        | ≤ 4.0     | ≤ 5.5        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 64 QAM     | ≤ 9.0                                                   | ≤ 12.0       | ≤ 6.5     | ≤ 8.5        | ≤ 5.5     | ≤ 6.5        | ≤ 5.5     | ≤ 5.5        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 256 QAM    | ≤ 9.0                                                   | ≤ 12.0       | ≤ 7.0     | ≤ 8.5        | ≤ 7.0     | ≤ 7.0        | ≤ 7.0     | ≤ 7.0        |
| NOTE 1: Full allocation A-MPR applies when all RB's in a 20 MHz channel or all RB's in all sub-bands for wideband operation are fully allocated and all sub-bands are transmitted. Partial allocation A-MPR applies when one or more RB's in one or more sub-bands are not allocated but when all sub-bands within the channel are transmitted. When not all sub-bands within the channel are transmitted, the A-MPR associated with the channel bandwidth according to the bandwidth of the contiguously transmitted sub-bands and according to the allocation type applies. |            |                                                         |              |           |              |           |              |           |              |

## 6.2F.3.7 A-MPR for NS\_54

When "NS\_54" is indicated in the cell, the A-MPR is specified in Table 6.2F.3.7-1.

**Table 6.2F.3.7-1: A-MPR for NS\_54 power class 5**

| Pre-coding                                                                                                                                                                                                                                                                                                                                                         | Modulation | RB Allocation (Note 2) | RB Allocation (Note 3) |              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------------------|------------------------|--------------|
|                                                                                                                                                                                                                                                                                                                                                                    |            | Full/Partial           | Full (dB)              | Partial (dB) |
| DFT-s-OFDM                                                                                                                                                                                                                                                                                                                                                         | QPSK       | See Table 6.2F.2-1     | $\leq 2.5$             | $\leq 5.0$   |
|                                                                                                                                                                                                                                                                                                                                                                    | 16 QAM     |                        | $\leq 3.0$             | $\leq 5.0$   |
|                                                                                                                                                                                                                                                                                                                                                                    | 64 QAM     |                        | $\leq 3.5$             | $\leq 5.0$   |
|                                                                                                                                                                                                                                                                                                                                                                    | 256 QAM    |                        | $\leq 5.0$             | $\leq 6.0$   |
| CP-OFDM                                                                                                                                                                                                                                                                                                                                                            | QPSK       |                        | $\leq 4.5$             | $\leq 6.0$   |
|                                                                                                                                                                                                                                                                                                                                                                    | 16 QAM     |                        | $\leq 4.5$             | $\leq 6.0$   |
|                                                                                                                                                                                                                                                                                                                                                                    | 64 QAM     |                        | $\leq 5.5$             | $\leq 6.0$   |
|                                                                                                                                                                                                                                                                                                                                                                    | 256 QAM    |                        | $\leq 7.0$             | $\leq 7.0$   |
| NOTE 1: Full allocation A-MPR applies when all RB's in a 20 MHz channel or all RB's in all sub-bands for wideband operation are fully allocated and all sub-bands are transmitted. Partial allocation A-MPR applies when one or more RB's in one or more sub-bands are not allocated or when not all transmitted sub-bands for wideband operation are transmitted. |            |                        |                        |              |
| NOTE 2: Applicable for all valid channels and bandwidths other than those enumerated in NOTE 3.                                                                                                                                                                                                                                                                    |            |                        |                        |              |
| NOTE 3: Applicable for 40 MHz channels centered at the nearest NR-ARFCN corresponding to [5965 MHz], 60 MHz channels centered at the nearest NR-ARFCN corresponding to [5975 and 5995 MHz], and 80 MHz channels centered at the nearest NR-ARFCN corresponding to [5985 MHz].                                                                                      |            |                        |                        |              |

### 6.2F.3.8 A-MPR for NS\_58

When "NS\_58" is indicated in the cell, the A-MPR is specified in Table 6.2F.3.8-1.

**Table 6.2F.3.8-1: A-MPR for NS\_58 power class 5**

| Pre-coding                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Modulation             | RB Allocation          |                           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|------------------------|---------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                        | Full <sup>2</sup> (dB) | Partial <sup>3</sup> (dB) |
| DFT-s-OFDM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Pi/2 BPSK <sup>4</sup> | $\leq 1.5$             | $\leq 2.5$                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | QPSK                   | $\leq 2.0$             | $\leq 3.5$                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 16 QAM                 | $\leq 2.5$             | $\leq 4.0$                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 64 QAM                 | $\leq 3.5$             | $\leq 4.5$                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 256 QAM                | $\leq 5.0$             | $\leq 5.5$                |
| CP-OFDM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | QPSK                   | $\leq 3.5$             | $\leq 4.5$                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 16 QAM                 | $\leq 4.0$             | $\leq 4.5$                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 64 QAM                 | $\leq 5.5$             | $\leq 5.5$                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 256 QAM                | $\leq 7.0$             | $\leq 7.0$                |
| <p>NOTE 1: The A-MPR shall apply to all SCS in all active 20 MHz sub-bands contiguously allocated in the channel. The MPR applies to interlaced allocations with uplink resource allocation type 2 as specified in TS 38.214 [10].</p> <p>NOTE 2: Full RB allocation A-MPR applies when all RB's in a 20 MHz channel or all RB's in all sub-bands for wideband operation are fully allocated and sub-bands are transmitted according to configuration A in Table 6.2F.2-2.</p> <p>NOTE 3: Partial RB allocation A-MPR applies when one or more RB's in one or more sub-bands are not allocated or when the transmitted sub-bands for wideband operation are transmitted according to configuration B in Table 6.2F.2-2.</p> <p>NOTE 4: Applicable to Pi/2-BPSK modulation when IE powerBoostPi2BPSK is set to 0.</p> <p>NOTE 5: The A-MPR applies instead of MPR for 20 MHz channel centered at the nearest NR-ARFCN corresponding to 5955 MHz, 40 MHz channel at the nearest NR-ARFCN corresponding to 5965 MHz, 60 MHz channel at the nearest NR-ARFCN corresponding to 5975 MHz, and 80 MHz channel at the nearest NR-ARFCN corresponding to 5985 MHz. For</p> |                        |                        |                           |

|                                                                                   |
|-----------------------------------------------------------------------------------|
| all other channels, A-MPR is zero and MPR as specified in Table 6.2F.2-1 applies. |
|-----------------------------------------------------------------------------------|

### 6.2F.3.9 A-MPR for NS\_59

When "NS\_59" is indicated in the cell, the A-MPR is specified in Table 6.2F.3.9-1.

**Table 6.2F.3.9-1: A-MPR for NS\_59 power class 5**

| Pre-coding                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Modulation | Channel bandwidth (Sub-band allocation) / RB Allocation |              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------------------------------------------------------|--------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |            | Full (dB)                                               | Partial (dB) |
| DFT-s-OFDM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | PI/2 BPSK  | ≤ 3.0                                                   | ≤ 5.5        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | QPSK       | ≤ 3.0                                                   | ≤ 5.5        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 16 QAM     | ≤ 3.0                                                   | ≤ 5.5        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 64 QAM     | ≤ 3.5                                                   | ≤ 5.5        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 256 QAM    | ≤ 5.0                                                   | ≤ 5.5        |
| CP-OFDM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | QPSK       | ≤ 3.5                                                   | ≤ 5.5        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 16 QAM     | ≤ 4.0                                                   | ≤ 5.5        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 64 QAM     | ≤ 5.5                                                   | ≤ 5.5        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 256 QAM    | ≤ 7.0                                                   | ≤ 7.0        |
| NOTE 1: Full allocation A-MPR applies when all RB's in a 20 MHz channel or all RB's in all sub-bands for wideband operation are fully allocated and all sub-bands are transmitted. Partial allocation A-MPR applies when one or more RB's in one or more sub-bands are not allocated but when all sub-bands within the channel are transmitted. When not all sub-bands within the channel are transmitted, the A-MPR associated with the channel bandwidth according to the bandwidth of the contiguously transmitted sub-bands and according to the allocation type applies |            |                                                         |              |

### 6.2F.3.10 A-MPR for NS\_60

When "NS\_60" is indicated in the cell, the A-MPR is specified in Table 6.2F.3.10-1.

**Table 6.2F.3.10-1: A-MPR for NS\_60 power class 5**

| Pre-coding                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Modulation | Channel bandwidth (Sub-band allocation) / RB Allocation |              |           |              |           |              |           |              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------------------------------------------------------|--------------|-----------|--------------|-----------|--------------|-----------|--------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |            | 20 MHz                                                  |              | 40 MHz    |              | 60 MHz    |              | 80 MHz    |              |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |            | Full (dB)                                               | Partial (dB) | Full (dB) | Partial (dB) | Full (dB) | Partial (dB) | Full (dB) | Partial (dB) |
| DFT-s-OFDM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | QPSK       | ≤ 6.0                                                   | ≤ 8.5        | ≤ 4.0     | ≤ 5.5        | ≤ 3.5     | ≤ 4.5        | ≤ 3.0     | ≤ 4.5        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 16 QAM     | ≤ 6.0                                                   | ≤ 8.5        | ≤ 4.0     | ≤ 5.5        | ≤ 4.0     | ≤ 5.0        | ≤ 3.5     | ≤ 5.0        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 64 QAM     | ≤ 6.0                                                   | ≤ 8.5        | ≤ 4.0     | ≤ 5.5        | ≤ 4.0     | ≤ 5.0        | ≤ 3.5     | ≤ 5.0        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 256 QAM    | ≤ 6.0                                                   | ≤ 8.5        | ≤ 5.0     | ≤ 5.5        | ≤ 5.0     | ≤ 5.5        | ≤ 5.0     | ≤ 5.5        |
| CP-OFDM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | QPSK       | ≤ 6.0                                                   | ≤ 8.5        | ≤ 5.5     | ≤ 5.5        | ≤ 5.0     | ≤ 5.5        | ≤ 4.5     | ≤ 5.5        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 16 QAM     | ≤ 6.0                                                   | ≤ 8.5        | ≤ 5.5     | ≤ 5.5        | ≤ 5.0     | ≤ 5.5        | ≤ 4.5     | ≤ 5.5        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 64 QAM     | ≤ 6.0                                                   | ≤ 8.5        | ≤ 5.5     | ≤ 5.5        | ≤ 5.5     | ≤ 5.5        | ≤ 5.5     | ≤ 5.5        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 256 QAM    | ≤ 6.0                                                   | ≤ 8.5        | ≤ 7.0     | ≤ 7.0        | ≤ 7.0     | ≤ 7.0        | ≤ 7.0     | ≤ 7.0        |
| NOTE 1: Full allocation A-MPR applies when all RB's in a 20 MHz channel or all RB's in all sub-bands for wideband operation are fully allocated and all sub-bands are transmitted. Partial allocation A-MPR applies when one or more RB's in one or more sub-bands are not allocated but when all sub-bands within the channel are transmitted. When not all sub-bands within the channel are transmitted, the A-MPR associated with the channel bandwidth according to the bandwidth of the contiguously transmitted sub-bands and according to the allocation type applies |            |                                                         |              |           |              |           |              |           |              |

### 6.2F.3.11 A-MPR for NS\_61

When "NS\_61" is indicated in the cell, the A-MPR is specified in Table 6.2F.3.11-1.

**Table 6.2F.3.11-1: A-MPR for NS\_61 power class 5**

| Pre-coding                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Modulation             | Channel bandwidth (Sub-band allocation) / RB Allocation |              |           |              |           |              |           |              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------------------------------------------------|--------------|-----------|--------------|-----------|--------------|-----------|--------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                        | 20 MHz                                                  |              | 40 MHz    |              | 60 MHz    |              | 80 MHz    |              |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                        | Full (dB)                                               | Partial (dB) | Full (dB) | Partial (dB) | Full (dB) | Partial (dB) | Full (dB) | Partial (dB) |
| DFT-s-OFDM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | PI/2 BPSK <sup>2</sup> | ≤ 7.5                                                   | ≤ 10.0       | ≤ 6.5     | ≤ 6.5        | ≤ 6.0     | ≤ 6.0        | ≤ 6.0     | ≤ 6.0        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | QPSK                   | ≤ 7.5                                                   | ≤ 10.0       | ≤ 6.5     | ≤ 6.5        | ≤ 6.0     | ≤ 6.0        | ≤ 6.0     | ≤ 6.0        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 16 QAM                 | ≤ 7.5                                                   | ≤ 10.5       | ≤ 6.5     | ≤ 6.5        | ≤ 6.0     | ≤ 6.0        | ≤ 6.0     | ≤ 6.0        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 64 QAM                 | ≤ 7.5                                                   | ≤ 10.5       | ≤ 6.5     | ≤ 6.5        | ≤ 6.0     | ≤ 6.0        | ≤ 6.0     | ≤ 6.0        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 256 QAM                | ≤ 7.5                                                   | ≤ 10.5       | ≤ 6.5     | ≤ 6.5        | ≤ 6.0     | ≤ 6.0        | ≤ 6.0     | ≤ 6.0        |
| CP-OFDM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | QPSK                   | ≤ 7.5                                                   | ≤ 10.0       | ≤ 6.5     | ≤ 6.5        | ≤ 6.0     | ≤ 6.0        | ≤ 6.0     | ≤ 6.0        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 16 QAM                 | ≤ 7.5                                                   | ≤ 10.5       | ≤ 6.5     | ≤ 6.5        | ≤ 6.0     | ≤ 6.0        | ≤ 6.0     | ≤ 6.0        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 64 QAM                 | ≤ 7.5                                                   | ≤ 10.5       | ≤ 6.5     | ≤ 6.5        | ≤ 6.0     | ≤ 6.0        | ≤ 6.0     | ≤ 6.0        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 256 QAM                | ≤ 7.5                                                   | ≤ 10.5       | ≤ 7.0     | ≤ 7.0        | ≤ 7.0     | ≤ 7.0        | ≤ 7.0     | ≤ 7.0        |
| NOTE 1: Full allocation A-MPR applies when all RB's in a 20 MHz channel or all RB's in all sub-bands for wideband operation are fully allocated and all sub-bands are transmitted. Partial allocation A-MPR applies when one or more RB's in one or more sub-bands are not allocated but when all sub-bands within the channel are transmitted. When not all sub-bands within the channel are transmitted, the A-MPR associated with the channel bandwidth according to the bandwidth of the contiguously transmitted sub-bands and according to the allocation type applies.<br>NOTE 2: Applicable to PI/2-BPSK modulation when IE powerBoostPi2BPSK is set to 0. |                        |                                                         |              |           |              |           |              |           |              |

## 6.2F.3A UE additional maximum output power reduction for CA

### 6.2F.3A.1 UE additional maximum output power reduction for inter-band CA

For inter-band carrier aggregation with uplink assigned to two bands and including one of the bands listed in Table 6.2F.1-1, the requirements in clause 6.2.3 apply for the NR uplink carrier and clause 6.2F.3 for the carrier operating with shared spectrum access.

### 6.2F.3D UE additional maximum output power reduction for UL MIMO

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the A-MPR values specified in clause 6.2F.3 shall apply to the maximum output power specified in Table 6.2F.1D-1. The requirements shall be met with the UL MIMO configurations specified in Table 6.2D.1-2. For UE supporting UL MIMO, the maximum output power is defined as the sum of the maximum output power from both UE antenna connector.

For UE supporting uplink full power transmission (ULFPTx) for UL MIMO, the A-MPR values specified in clause 6.2F.3 shall apply to the maximum output power specified in Table 6.2F.1D-1. The requirements shall be met with the PUSCH configurations specified in Table 6.2D.1-3, based upon UE's support of uplink full power transmission mode.

For the UE maximum output power modified by A-MPR, the power limits specified in clause 6.2D.4 apply.

If UE is scheduled for single antenna-port PUSCH transmission by DCI format 0\_0 or by DCI format 0\_1 for single antenna port codebook based transmission, the requirements in clause 6.2.4 apply for the power class as indicated by the *ue-PowerClass* field in capability signaling.

## 6.2F.4 Configured transmitted power

The requirements for configured maximum output power in clause 6.2.4 apply.

## 6.2F.4D Configured transmitted power UL MIMO

For UE supporting UL MIMO, the transmitted power is configured per each UE.

The definitions of configured maximum output power  $P_{\text{CMAX},c}$ , the lower bound  $P_{\text{CMAX}_L,c}$ , and the higher bound  $P_{\text{CMAX}_H,c}$  specified in clause 6.2.4 shall apply to UE supporting UL MIMO, where

- $P_{\text{PowerClass}}$ ,  $\Delta P_{\text{PowerClass}}$  and  $\Delta T_{C,c}$  are specified in clause 6.2.4 unless otherwise stated;
- $\text{MPR}_c$  is specified in clause 6.2F.2D;
- $\text{A-MPR}_c$  is specified in clause 6.2F.3.

The measured configured maximum output power  $P_{\text{UMAX},c}$  for serving cell  $c$  shall be within the following bounds:

$$P_{\text{CMAX}_L,c} - \text{MAX}\{T_L, T_{\text{LOW}}(P_{\text{CMAX}_L,c})\} \leq P_{\text{UMAX},c} \leq P_{\text{CMAX}_H,c} + T_{\text{HIGH}}(P_{\text{CMAX}_H,c})$$

where  $T_{\text{LOW}}(P_{\text{CMAX}_L,c})$  and  $T_{\text{HIGH}}(P_{\text{CMAX}_H,c})$  are defined as the tolerance and applies to  $P_{\text{CMAX}_L,c}$  and  $P_{\text{CMAX}_H,c}$  separately, while  $T_L$  is the absolute value of the lower tolerance in Table 6.2F.1D-1 for the applicable operating band.

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the tolerance is specified in Table 6.2F.4D-1. The requirements shall be met with UL MIMO configurations specified in Table 6.2D.1-2.

For UE supporting uplink full power transmission (ULFPTx) for UL MIMO, the tolerance is specified in Table 6.2F.4D-1. The requirements shall be met with the PUSCH configurations specified in Table 6.2D.1-3, based upon UE's support of uplink full power transmission mode.

**Table 6.2F.4D-1:  $P_{\text{CMAX},c}$  tolerance in closed-loop spatial multiplexing scheme**

| $P_{\text{CMAX},c}$<br>(dBm)     | Tolerance<br>$T_{\text{LOW}}(P_{\text{CMAX}_L,c})$ (dB) | Tolerance<br>$T_{\text{HIGH}}(P_{\text{CMAX}_H,c})$ (dB) |
|----------------------------------|---------------------------------------------------------|----------------------------------------------------------|
| $P_{\text{CMAX},c} = 23$         | 3.0                                                     | 2.0                                                      |
| $20 \leq P_{\text{CMAX},c} < 23$ | 3.0                                                     | 2.0                                                      |
| $19 \leq P_{\text{CMAX},c} < 20$ | 5.0                                                     | 2.0                                                      |
| $18 \leq P_{\text{CMAX},c} < 19$ | 5.0                                                     | 3.0                                                      |
| $17 \leq P_{\text{CMAX},c} < 18$ | 5.0                                                     | 4.0                                                      |
| $13 \leq P_{\text{CMAX},c} < 17$ | 5.0                                                     |                                                          |
| $8 \leq P_{\text{CMAX},c} < 13$  | 6.0                                                     |                                                          |
| $-40 \leq P_{\text{CMAX},c} < 8$ | 7.0                                                     |                                                          |

## 6.2G Transmitter power for Tx Diversity

### 6.2G.1 UE maximum output power for Tx Diversity

For UE supporting Tx Diversity, the maximum output power as indicated by UE power class in Table 6.2.1-1 is defined as the sum of the maximum output power from both UE antenna connectors. The period of measurement shall be at least one sub frame (1 ms).

When a UE indicates PC1.5 for a given band it achieves maximum power by means of Tx Diversity in the current version of the spec. Therefore, Tx Diversity is implied for PC1.5 even if the UE does not indicate txDiversity-r16 in the UE capabilities,

### 6.2G.2 UE maximum output power reduction for Tx Diversity

For UE supporting Tx diversity, the allowed MPR for the maximum output power is specified in Table 6.2.2-1, Table 6.2D.2-1, Table 6.2D.2-2 and Table 6.2D.2-3 for UE power class 3, 2 and 1.5 respectively. For UE power class 1.5, the allowed maximum power reduction (MPR) defined in Table 6.2D.2-3 is in accordance with the indicated *modifiedMPR-Behavior* specified in Table L.1-1 for channel bandwidths  $\leq 100$  MHz. The maximum output power is defined as the sum of the maximum output power at each UE antenna connector. If a UE that supports PC1.5 has to apply the requirements of PC2 according to the rules in clause 6.2.1, the MPR requirements in Table 6.2.2-2 apply

## 6.2G.3 UE additional maximum output power reduction for Tx Diversity

For UE supporting Tx diversity, the A-MPR values specified in clause 6.2.3 shall apply to the maximum output power specified in Table 6.2.1-1, and the maximum output power is defined as the sum of the maximum output power at each UE antenna connector. Unless stated otherwise, an A-MPR of 0 dB shall be used.

## 6.2G.4 Configured transmitted power for Tx Diversity

For UE supporting Tx diversity, the transmitted power is configured per each UE.

The definitions of configured maximum output power  $P_{\text{CMAX},c}$ , the lower bound  $P_{\text{CMAX}_L,c}$ , and the higher bound  $P_{\text{CMAX}_H,c}$  specified in clause 6.2.4 shall apply to UE supporting Tx diversity, where

- $P_{\text{PowerClass}}$ ,  $\Delta P_{\text{PowerClass}}$  and  $\Delta T_{C,c}$  are specified in clause 6.2.4 unless otherwise stated;
- $\text{MPR}_c$  is specified in clause 6.2G.2;

The measured configured maximum output power  $P_{\text{UMAX},c}$  for serving cell  $c$  shall be within the following bounds:

$$P_{\text{CMAX}_L,c} - \text{MAX}\{T_L, T_{\text{LOW}}(P_{\text{CMAX}_L,c})\} \leq P_{\text{UMAX},c} \leq P_{\text{CMAX}_H,c} + T_{\text{HIGH}}(P_{\text{CMAX}_H,c})$$

where  $T_{\text{LOW}}(P_{\text{CMAX}_L,c})$  and  $T_{\text{HIGH}}(P_{\text{CMAX}_H,c})$  are defined as the tolerance and applies to  $P_{\text{CMAX}_L,c}$  and  $P_{\text{CMAX}_H,c}$  separately, while  $T_L$  is the absolute value of the lower tolerance in Table 6.2.1-1 for the applicable operating band.

For UE supporting Tx diversity, the tolerance is specified in Table 6.2G.4-1.

**Table 6.2G.4-1:  $P_{\text{CMAX},c}$  tolerance for Tx Diversity**

| $P_{\text{CMAX},c}$<br>(dBm)        | Tolerance<br>$T_{\text{LOW}}(P_{\text{CMAX}_L,c})$ (dB) | Tolerance<br>$T_{\text{HIGH}}(P_{\text{CMAX}_H,c})$ (dB) |
|-------------------------------------|---------------------------------------------------------|----------------------------------------------------------|
| $23 \leq P_{\text{CMAX},c} \leq 29$ | 3.0                                                     | 2.0                                                      |
| $22 \leq P_{\text{CMAX},c} < 23$    | 5.0                                                     | 2.0                                                      |
| $21 \leq P_{\text{CMAX},c} < 22$    | 5.0                                                     | 3.0                                                      |
| $20 \leq P_{\text{CMAX},c} < 21$    | 5.0                                                     | 4.0                                                      |
| $16 \leq P_{\text{CMAX},c} < 20$    | 5.0                                                     |                                                          |
| $11 \leq P_{\text{CMAX},c} < 16$    | 6.0                                                     |                                                          |
| $-40 \leq P_{\text{CMAX},c} < 11$   | 7.0                                                     |                                                          |

## 6.2H Transmitter power for CA with UL MIMO

### 6.2H.1 Transmitter power for intra-band UL contiguous CA with UL MIMO

#### 6.2H.1.1 UE maximum output power for intra-band UL contiguous CA with UL MIMO

For intra-band UL contiguous CA and UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the maximum output power is defined as the sum of the maximum output power from both UE antenna connectors and all UL CCs. The period of measurement shall be at least one sub frame (1 ms), as specified in Table 6.2H.1.1-1. The requirements shall be met with the UL MIMO configurations specified in Table 6.2D.1-2 for 2 layer configuration and the PUSCH configurations specified in Table 6.2D.1-3 for ULFPTx configuration.

**Table 6.2H.1.1-1: UE Power Class for intra-band UL contiguous CA with UL MIMO in closed loop spatial multiplexing scheme**

| NR CA Configuration | Class 1 (dBm) | Tolerance (dB) | Class 2 (dBm) | Tolerance (dB) | Class 3 (dBm) | Tolerance (dB) | Class 5 (dBm) | Tolerance (dB) |
|---------------------|---------------|----------------|---------------|----------------|---------------|----------------|---------------|----------------|
| CA_n41C             |               |                | 26            | +2/-3          | 23            | +2/-3          |               |                |
| CA_n78C             |               |                | 26            | +2/-3          | 23            | +2/-3          |               |                |



NOTE 1: An uplink CA configuration in which the band has NOTE 3 in Table 6.2.1-1 is allowed to reduce the lower tolerance limit by 1.5 dB when the transmission bandwidths of the band are confined within  $F_{UL\_low}$  and  $F_{UL\_low} + 4$  MHz or  $F_{UL\_high} - 4$  MHz and  $F_{UL\_high}$ .

NOTE 2:  $P_{PowerClass}$  is the maximum UE power specified without taking into account the tolerance

If UE is scheduled for single antenna-port PUSCH transmission by DCI format 0\_0 or by DCI format 0\_1 for codebook based transmission with precoding matrix  $W=1$  [6.3.1.5 TS 38.211], the requirements in clause 6.2A.1.1 apply for at least one antenna connector for the power class as indicated by the *ue-PowerClass* field in capability signalling.

### 6.2H.1.2 UE maximum output power reduction for intra-band UL contiguous CA with UL MIMO

For intra-band UL contiguous CA and UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2H.1.1-1 is specified in Table 6.2A.2.1-1, Table 6.2A.2.1-2 for power class 3 CA; Table 6.2A.2.1-1b, Table 6.2A.2.1-4 for power class 2 CA.

The requirements shall be met with UL MIMO configurations defined in Table 6.2D.1-2 for 2 layer configuration and the PUSCH configurations specified in Table 6.2D.1-3 for ULFPTx configuration. For the UE maximum output power modified by MPR, the power limits specified in clause 6.2H.1.4 apply.

If UE is scheduled for single antenna-port PUSCH transmission by DCI format 0\_0 or by DCI format 0\_1 for single antenna port codebook based transmission with precoding matrix  $W=1$  [6.3.1.5 TS 38.211], the requirements in clause 6.2A.2.1 apply for the power class as indicated by the *ue-PowerClass* field in capability signaling.

### 6.2H.1.3 UE additional maximum output power reduction for intra-band UL contiguous CA with UL MIMO

For intra-band UL contiguous CA and UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the A-MPR values specified in clause 6.2A.3.1.1 shall apply to the maximum output power specified in Table 6.2H.1.1-1. The requirements shall be met with UL MIMO configurations defined in Table 6.2D.1-2 for 2 layer configuration and the PUSCH configurations specified in Table 6.2D.1-3 for ULFPTx configuration.

For the UE maximum output power modified by A-MPR, the power limits specified in clause 6.2H.1.4 apply.

If UE is scheduled for single antenna-port PUSCH transmission by DCI format 0\_0 or by DCI format 0\_1 for single antenna port codebook based transmission with precoding matrix  $W=1$  [6.3.1.5 TS 38.211], the requirements in clause 6.2A.3.1.1 apply for the power class as indicated by the *ue-PowerClass* field in capability signaling.

### 6.2H.1.4 Configured transmitted power for intra-band UL contiguous CA with UL MIMO

For UE supporting intra-band UL contiguous CA with UL MIMO, the transmitted power is configured per each UE.

The definitions of configured maximum output power  $P_{CMAX,C}$ , the lower bound  $P_{CMAX\_L,C}$ , and the higher bound  $P_{CMAX\_H,C}$  specified in clause 6.2A.4.1.1 shall apply to UE supporting intra-band UL contiguous CA with UL MIMO, where

- $\Delta P_{PowerClass,CA}$  and  $\Delta T_{C,c}$  are specified in clause 6.2A.4.1.1 unless otherwise stated;
- $P_{PowerClass,CA}$  is the maximum UE power specified in Table 6.2H.1.1-1 without taking into account the tolerance;
- MPR, AMPR is specified in clause 6.2H.1.2 and 6.2H.1.3;

The measured configured maximum output power  $P_{UMAX}$  over all serving cells shall be within the following bounds:

$$P_{CMAX\_L} - \text{MAX}\{T_L, T_{LOW}(P_{CMAX\_L})\} \leq P_{UMAX} \leq P_{CMAX\_H} + T_{HIGH}(P_{CMAX\_H})$$

where  $T_{LOW}(P_{CMAX\_L})$  and  $T_{HIGH}(P_{CMAX\_H})$  are defined as the tolerance and applies to  $P_{CMAX\_L}$  and  $P_{CMAX\_H}$  separately, while  $T_L$  is the absolute value of the lower tolerance in Table 6.2H.1.1-1 for the applicable operating band.

For UE supporting intra-band UL contiguous CA with UL MIMO, the tolerance is specified in Table 6.2H.1.4-1.

**Table 6.2H.1.4-1:  $P_{\text{CMAX}}$  tolerance for intra-band UL contiguous CA with UL MIMO**

| $P_{\text{CMAX}}$<br>(dBm)        | Tolerance<br>$T_{\text{LOW}}(P_{\text{CMAX\_L}})$ (dB) | Tolerance<br>$T_{\text{HIGH}}(P_{\text{CMAX\_H}})$ (dB) |
|-----------------------------------|--------------------------------------------------------|---------------------------------------------------------|
| $23 \leq P_{\text{CMAX}} \leq 26$ | 3.0                                                    | 2.0                                                     |
| $22 \leq P_{\text{CMAX}} < 23$    | 5.0                                                    | 2.0                                                     |
| $21 \leq P_{\text{CMAX}} < 22$    | 5.0                                                    | 3.0                                                     |
| $20 \leq P_{\text{CMAX}} < 21$    | 5.0                                                    | 4.0                                                     |
| $16 \leq P_{\text{CMAX}} < 20$    | 5.0                                                    |                                                         |
| $11 \leq P_{\text{CMAX}} < 16$    | 6.0                                                    |                                                         |
| $-40 \leq P_{\text{CMAX}} < 11$   | 7.0                                                    |                                                         |

## 6.2I Transmitter power for RedCap

### 6.2I.1 Maximum output power for RedCap

For Redcap UE, the requirements for power class 3 specified in clause 6.2.1 apply.

## 6.3 Output power dynamics

### 6.3.1 Minimum output power

The minimum controlled output power of the UE is defined as the power in the channel bandwidth for all transmit bandwidth configurations (resource blocks), when the power is set to a minimum value.

The minimum output power is defined as the mean power in at least one sub-frame 1 ms. The minimum output power shall not exceed the values specified in Table 6.3.1-1.

**Table 6.3.1-1: Minimum output power**

| Channel bandwidth                                                                                | (MHz) | 5,10,15,20                               | 25,30,35,40,45,50                          | 60,70,80,90,100                            |
|--------------------------------------------------------------------------------------------------|-------|------------------------------------------|--------------------------------------------|--------------------------------------------|
| REF_SCS                                                                                          | (kHz) | 15                                       |                                            | 30                                         |
| Minimum output power                                                                             | (dBm) | -40                                      | $-40+10\log_{10} (BW_{\text{Channel}}/20)$ | $-40+10\log_{10} (BW_{\text{Channel}}/20)$ |
| Measurement bandwidth                                                                            | (MHz) | MBW=REF_SCS*(12*N <sub>RB</sub> +1)/1000 |                                            |                                            |
| NOTE: The minimum output power value is rounded to the nearest number down to one decimal point. |       |                                          |                                            |                                            |

### 6.3.2 Transmit OFF power

Transmit OFF power is defined as the mean power in the channel bandwidth when the transmitter is OFF. The transmitter is considered OFF when the UE is not allowed to transmit on any of its ports..

The transmit OFF power is defined as the mean power in a duration of at least one sub-frame (1 ms) excluding any transient periods. The transmit OFF power shall not exceed the values specified in Table 6.3.2-1.

**Table 6.3.2-1: Transmit OFF power**

| Channel bandwidth | (MHz) | 5,10,15,20,25,30,35,40,45,50 | 60,70,80,90,100 |
|-------------------|-------|------------------------------|-----------------|
| REF_SCS           | (kHz) | 15                           | 30              |

|                                                                                                                     |       |                                             |
|---------------------------------------------------------------------------------------------------------------------|-------|---------------------------------------------|
| <b>Transmit OFF power</b>                                                                                           | (dBm) | -50                                         |
| <b>Measurement bandwidth</b>                                                                                        | (MHz) | $MBW = REF\_SCS * (12 * N_{RB} + 1) / 1000$ |
| NOTE : “ $N_{RB}$ ” in the formula is the maximum transmission bandwidth configuration as defined in Table 5.3.2-1. |       |                                             |

### 6.3.3 Transmit ON/OFF time mask

#### 6.3.3.1 General

The transmit power time mask defines the transient period(s) allowed

- between transmit OFF power as defined in clause 6.3.2 and transmit ON power symbols (transmit ON/OFF)
- between continuous ON-power transmissions with power change or RB hopping is applied. When a UE signals the transient period capability, the transient period value ( $tp$ ) can be 2, 4, or 7  $\mu$ s. If no capability is signalled, the default transient period value of 10  $\mu$ s applies.

In case of RB hopping, and in following figures where  $tp_{start}$  is specified, the transient period is shared symmetrically when the transient period is 10  $\mu$ s. If the UE signals a transient period ( $tp$ ) of 2, 4 or 7  $\mu$ s, the transient period start position is given by  $tp_{start}$  in Table 6.3.3.1-1.

**Table 6.3.3.1-1  $tp_{start}$  values**

| <b><math>tp</math><br/>(<math>\mu</math>s)</b>                                           | <b><math>tp_{start}</math> (<math>\mu</math>s)</b> |
|------------------------------------------------------------------------------------------|----------------------------------------------------|
| 2                                                                                        | -0.5                                               |
| 4                                                                                        | -1                                                 |
| 7                                                                                        | -2.7                                               |
| NOTE 1: Negative values mean that the transient period starts before the symbol boundary |                                                    |

Unless otherwise stated the requirements in clause 6.5 apply also in transient periods.

In the following clauses, following definitions apply:

- A slot or long subslot transmission is a transmission with more than 2 symbols.
- A short subslot transmission is a transmission with 1 or 2 symbols.

#### 6.3.3.2 General ON/OFF time mask

The general ON/OFF time mask defines the observation period between transmit OFF and ON power and between transmit ON and OFF power for each SCS. ON/OFF scenarios include: contiguous, and non-contiguous transmission, etc

The OFF power measurement period is defined in a duration of at least one slot excluding any transient periods. The ON power is defined as the mean power over one slot excluding any transient period.

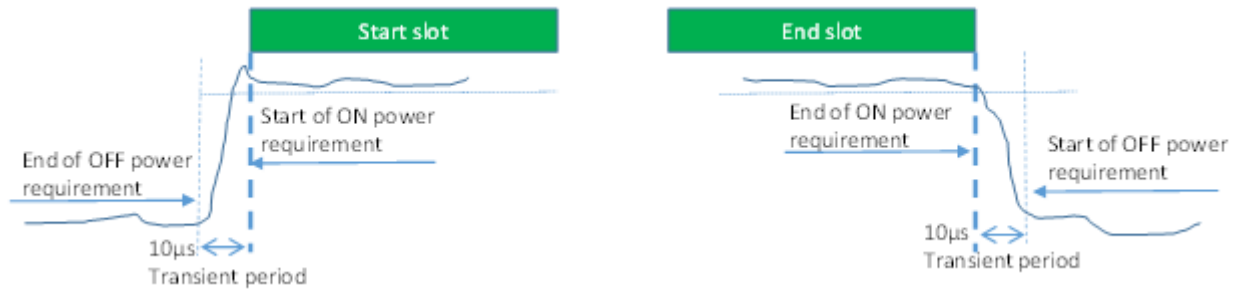


**Figure 6.3.3.2-1: General ON/OFF time mask for NR UL transmission in FR1**

### 6.3.3.3 Transmit power time mask for slot and short or long subslot boundaries

The transmit power time mask for slot and a long subslot transmission boundaries defines the transient periods allowed between slot and long subslot PUSCH transmissions. For PUSCH-PUCCH and PUSCH-SRS transitions and multiplexing the time masks in clause 6.3.3.7 apply.

The transmit power time mask for slot or long subslot and short subslot transmission boundaries defines the transient periods allowed between slot or long subslot and short subslot transmissions. The time masks in clause 6.3.3.8 apply.

The transmit power time mask for short subslot transmission boundaries defines the transient periods allowed between short subslot transmissions. The time masks in clause 6.3.3.9 apply.

### 6.3.3.4 PRACH time mask

The PRACH ON power is specified as the mean power over the PRACH measurement period excluding any transient periods as shown in Figure 6.3.3.4-1. The measurement period for different PRACH preamble format is specified in Table 6.3.3.4-1.

**Table 6.3.3.4-1: PRACH ON power measurement period**

| PRACH preamble format | SCS (kHz) | Measurement period (ms)                                                  |
|-----------------------|-----------|--------------------------------------------------------------------------|
| 0                     | 1.25      | 0.903125                                                                 |
| 1                     | 1.25      | 2.284375                                                                 |
| 2                     | 1.25      | 3.352604                                                                 |
| 3                     | 5         | 0.903125                                                                 |
| A1                    | 15        | 0.142708                                                                 |
|                       | 30        | 0.071354                                                                 |
| A2                    | 15        | 0.285417                                                                 |
|                       | 30        | 0.142708                                                                 |
| A3                    | 15        | 0.428125                                                                 |
|                       | 30        | 0.2140625                                                                |
| B1                    | 15        | 0.140365                                                                 |
|                       | 30        | 0.070182                                                                 |
| B4                    | 15        | 0.83046875                                                               |
|                       | 30        | 0.415234375                                                              |
| A1/B1                 | 15        | 0.142708 ms for first six occasion<br>0.140365 ms for the last occasion  |
|                       | 30        | 0.071354 ms for first six occasion<br>0.070182 ms for the last occasion  |
| A2/B2                 | 15        | 0.285417 ms for first two occasion<br>0.278385 ms for the third occasion |
|                       | 30        | 0.142708 ms for first two occasion                                       |

|                                                                                                                                                                        |    |                                                                               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-------------------------------------------------------------------------------|
|                                                                                                                                                                        |    | 0.1391925 ms for the third occasion                                           |
| A3/B3                                                                                                                                                                  | 15 | 0.428125 ms for the first occasion<br>0.41640625 ms for the second occasion   |
|                                                                                                                                                                        | 30 | 0.2140625 ms for the first occasion<br>0.208203125 ms for the second occasion |
| C0                                                                                                                                                                     | 15 | 0.10703125                                                                    |
|                                                                                                                                                                        | 30 | 0.053515625                                                                   |
| C2                                                                                                                                                                     | 15 | 0.333333                                                                      |
|                                                                                                                                                                        | 30 | 0.166667                                                                      |
| NOTE: For PRACH on PRACH occasion start from the beginning of 0.5 ms or span the boundary of 0.5 ms of the subframe, the measurement period will plus 0.032552 $\mu$ s |    |                                                                               |

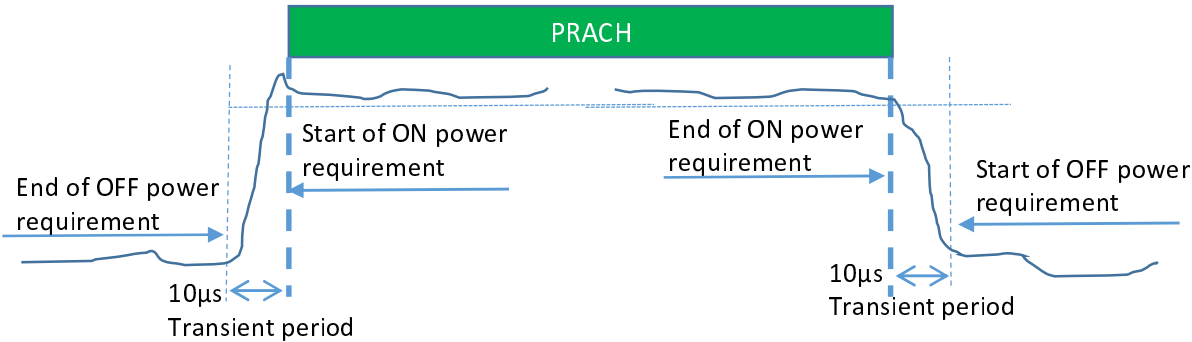


Figure 6.3.3.4-1: PRACH ON/OFF time mask

6.3.3.5 Void

6.3.3.6 SRS time mask

For SRS transmission mapped to one OFDM symbol, the ON power is defined as the mean power over the symbol duration excluding any transient period; See Figure 6.3.3.6-1

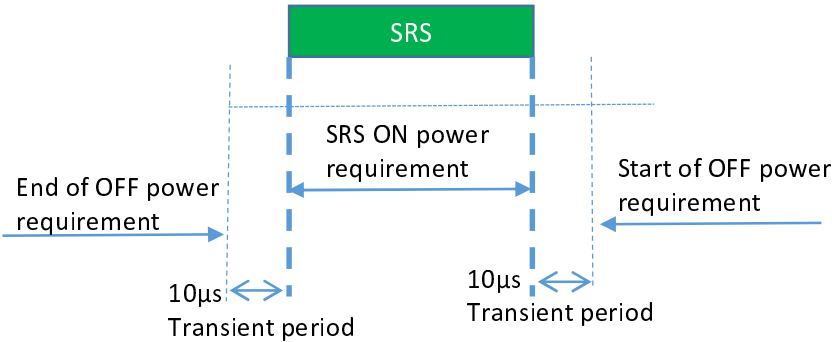


Figure 6.3.3.6-1: Single SRS time mask for NR UL transmission

For SRS transmission mapped to two or more OFDM symbols the ON power is defined as the mean power for each symbol duration excluding any transient period. For consecutive SRS transmissions without power change, Figure 6.3.3.6-2 applies.

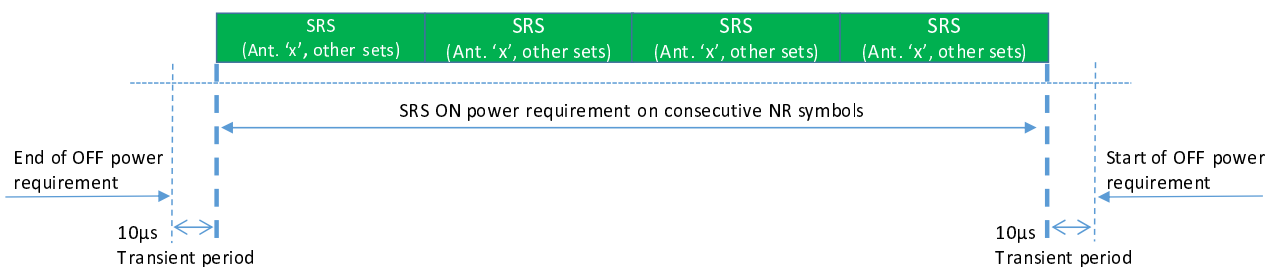


**Figure 6.3.3.6-2: Consecutive SRS time mask for the case when no power change is required with SRS usage other than antenna switching.**

When power change between consecutive SRS transmissions is required, then Figure 6.3.3.6-3 and Figure 6.3.3.6-4 apply.

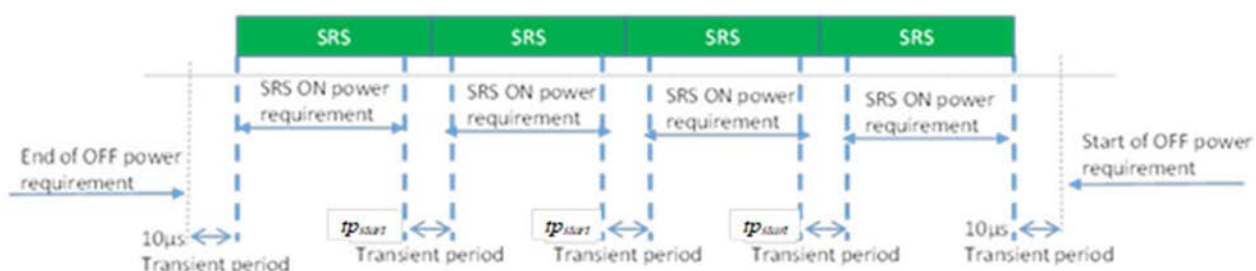


**Figure 6.3.3.6-3: Consecutive SRS time mask for the case when power change is required and when 15 kHz and 30 kHz SCS is used in FR1 with SRS usage other than antenna switching.**

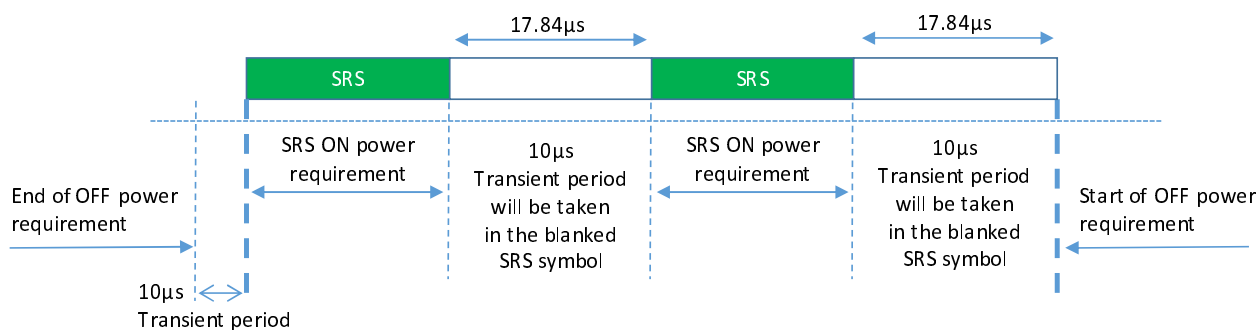


**Figure 6.3.3.6-4: Consecutive SRS time mask for the case when power change is required and when 60 kHz SCS is used in FR1, when the transient period is 10 μs**

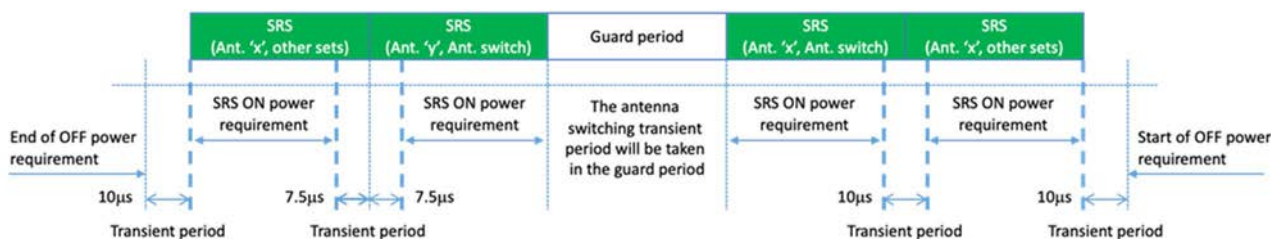


**Figure 6.3.3.6-5: FR1 Time mask for 15 kHz and 30 kHz SCS for the case when consecutive SRS switching usage is between antenna switching & other sets**

where "other sets" belongs to a "usage set" other than the set for antenna switching. The usage sets for SRS switching are defined in clause 6.2.1 of TS 38.214 [10].

NOTE: Guard period of one symbol is defined between two SRS resources of an SRS resource set for antenna switching for 15kHz, 30kHz and 60kHz SCS in Table 6.2.1.2-1 of TS 38.214 [10].

The above transient period applies to all the transmit CCs in CA with the CC sounding SRS. UE RF requirements do not apply during this transient period.

### 6.3.3.7 PUSCH-PUCCH and PUSCH-SRS time masks

The PUCCH/PUSCH/SRS time mask defines the observation period between sounding reference symbol (SRS) and an adjacent PUSCH/PUCCH symbol and subsequent UL transmissions. The time masks apply for all types of frame structures and their allowed PUCCH/PUSCH/SRS transmissions unless otherwise stated.

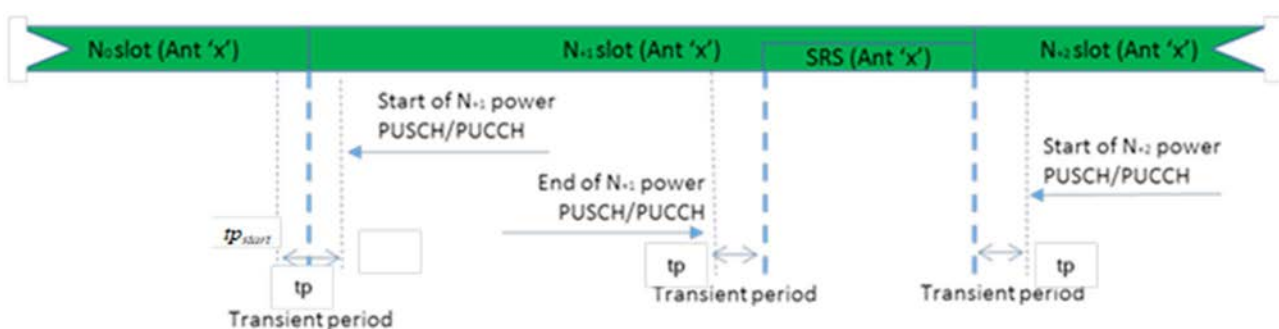


Figure 6.3.3.7-1: PUCCH/PUSCH/SRS time mask when there is a transmission before or after or both before and after SRS, when sounded on the same antenna (Ant 'x')

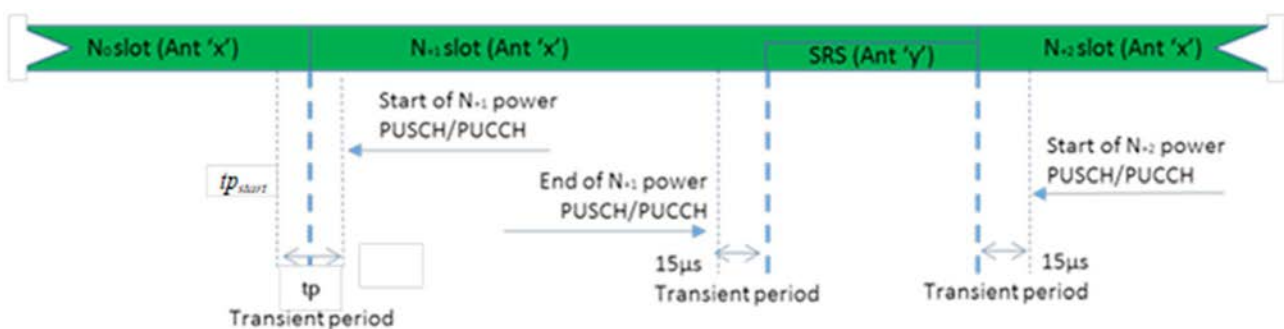


Figure 6.3.3.7-2: PUCCH/PUSCH/SRS time mask when there is a transmission before or after or both before and after SRS, when sounded on a different antenna (Ant 'x' and Ant 'y' are different antenna ports)

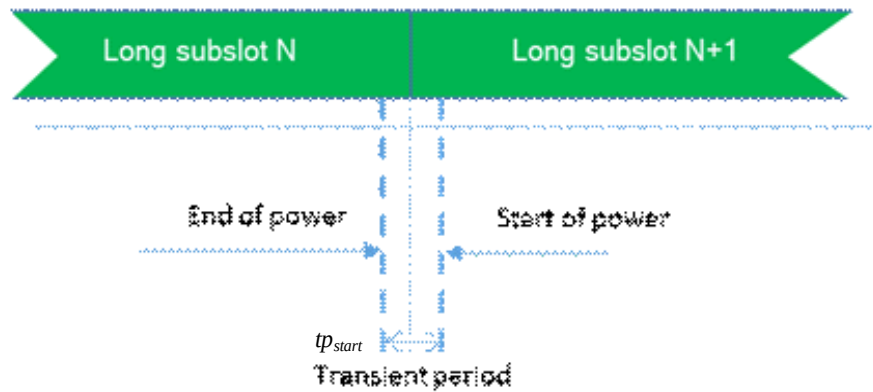


**Figure 6.3.3.7-3: Consecutive long subslot transmission and long subslot transmission time mask**

This transient period of 15  $\mu\text{s}$  applies before and after SRS transmission to all the transmit CCs in CA with the CC sounding SRS. UE RF requirements do not apply during this transient period.

When there is no transmission preceding SRS transmission or succeeding SRS transmission, then the same time mask applies as shown in Figure 6.3.3.7-1.

#### 6.3.3.8 Transmit power time mask for consecutive slot or long subslot transmission and short subslot transmission boundaries

The transmit power time mask for consecutive slot or long subslot transmission and short slot transmission boundaries defines the transient periods allowed between such transmissions.

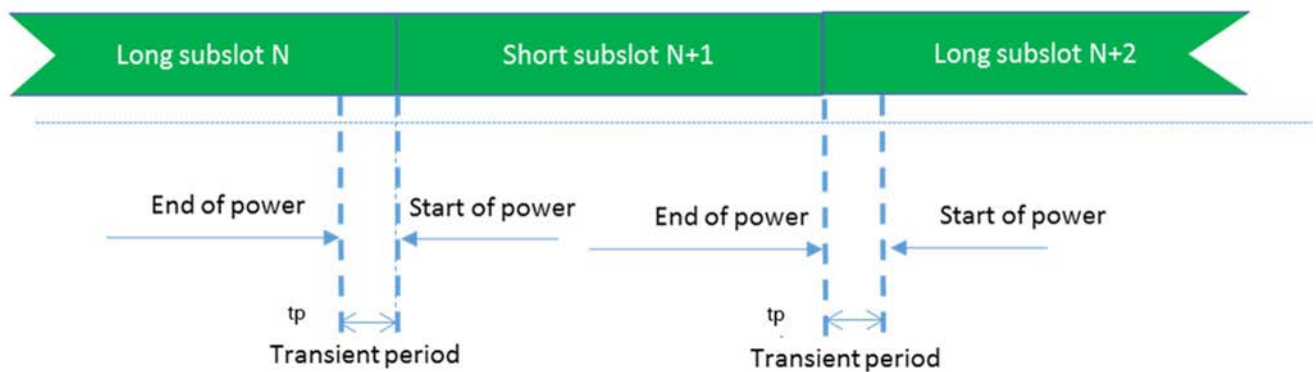


**Figure 6.3.3.8-1: Consecutive slot or long subslot transmission and short subslot transmission time mask**

#### 6.3.3.9 Transmit power time mask for consecutive short subslot transmissions boundaries

The transmit power time mask for consecutive short subslot transmission boundaries defines the transient periods allowed between short subslot transmissions.

The transient period shall be equally shared as shown on Figure 6.3.3.9-2.

**Figure 6.3.3.9-1: Void**



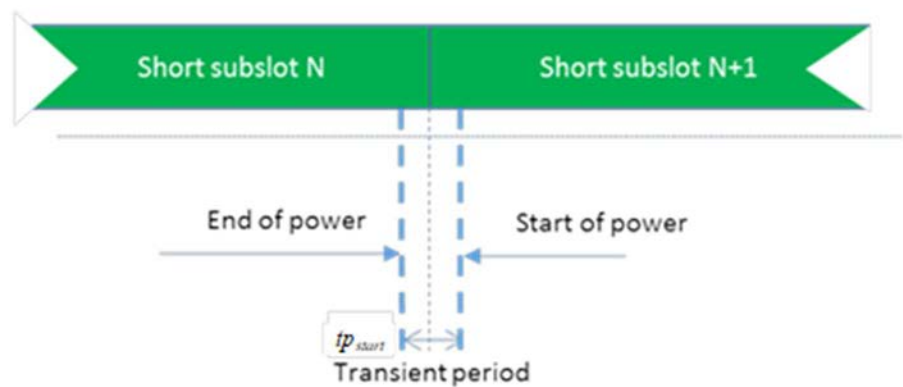


Figure 6.3.3.9-2: Consecutive short subslot transmissions time mask

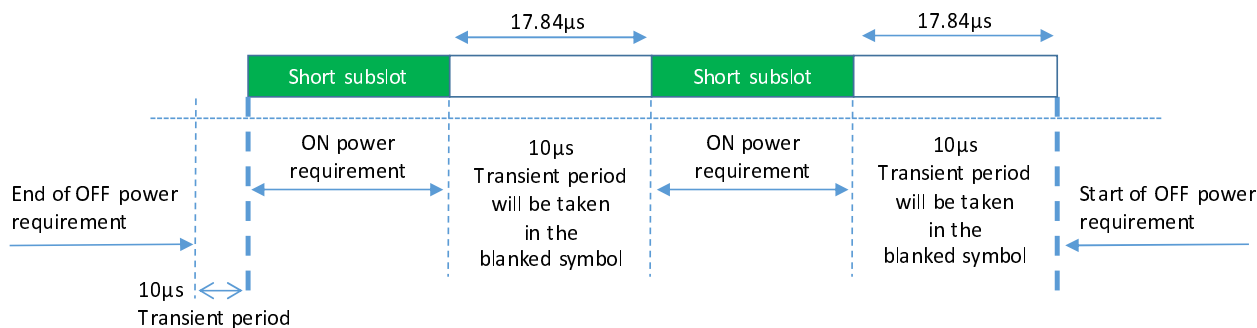


Figure 6.3.3.9-3: Consecutive short subslot (1 symbol gap) time mask for the case when transient period is required on both sides of the symbol and when 60 kHz SCS is used in FR1, where the transient period is 10 µs

6.3.4 Power control

6.3.4.1 General

The requirements on power control accuracy apply under normal conditions.

6.3.4.2 Absolute power tolerance

The absolute power tolerance is the ability of the UE transmitter to set its initial output power to a specific value for the first sub-frame (1 ms) at the start of a contiguous transmission or non-contiguous transmission with a transmission gap larger than 20 ms. The tolerance includes the channel estimation error.

The minimum requirement specified in Table 6.3.4.2-1 apply in the power range bounded by the minimum output power as specified in clause 6.3.1 and the maximum output power as specified in clause 6.2.1.

Table 6.3.4.2-1: Absolute power tolerance

| Conditions | Tolerance |
|------------|-----------|
| Normal     | ± 9.0 dB  |

### 6.3.4.3 Relative power tolerance

The relative power tolerance is the ability of the UE transmitter to set its output power in a target sub-frame (1 ms) relatively to the power of the most recently transmitted reference sub-frame (1 ms) if the transmission gap between these sub-frames is less than or equal to 20 ms.

The minimum requirements specified in Table 6.3.4.3-1 apply when the power of the target and reference sub-frames are within the power range bounded by the minimum output power as defined in clause 6.3.1 and the measured  $P_{\text{UMAX}}$  as defined in clause 6.2.4.

To account for RF Power amplifier mode changes, 2 exceptions are allowed for each of two test patterns. The test patterns are a monotonically increasing power sweep and a monotonically decreasing power sweep over a range bounded by the requirements of minimum power and maximum power specified in clauses 6.3.1 and 6.2.1, respectively. For those exceptions, the power tolerance limit is a maximum of  $\pm 6.0$  dB in Table 6.3.4.3-1.

**Table 6.3.4.3-1: Relative power tolerance**

| Power step $\Delta P$<br>(Up or down)<br>(dB)                                                                                                                                                                                                                                                              | All combinations<br>of PUSCH and<br>PUCCH<br>transitions (dB) | All combinations of<br>PUSCH/PUCCH and<br>SRS transitions<br>between sub-<br>frames (dB) | PRACH (dB) |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|------------------------------------------------------------------------------------------|------------|
| $\Delta P < 2$                                                                                                                                                                                                                                                                                             | $\pm 2.0$ (NOTE)                                              | $\pm 2.5$                                                                                | $\pm 2.0$  |
| $2 \leq \Delta P < 3$                                                                                                                                                                                                                                                                                      | $\pm 2.5$                                                     | $\pm 3.5$                                                                                | $\pm 2.5$  |
| $3 \leq \Delta P < 4$                                                                                                                                                                                                                                                                                      | $\pm 3.0$                                                     | $\pm 4.5$                                                                                | $\pm 3.0$  |
| $4 \leq \Delta P < 10$                                                                                                                                                                                                                                                                                     | $\pm 3.5$                                                     | $\pm 5.5$                                                                                | $\pm 3.5$  |
| $10 \leq \Delta P < 15$                                                                                                                                                                                                                                                                                    | $\pm 4.0$                                                     | $\pm 7.0$                                                                                | $\pm 4.0$  |
| $15 \leq \Delta P$                                                                                                                                                                                                                                                                                         | $\pm 5.0$                                                     | $\pm 8.0$                                                                                | $\pm 5.0$  |
| NOTE: For PUSCH to PUSCH transitions with the allocated resource blocks fixed in frequency and no transmission gaps other than those generated by downlink subframes, DwPTS fields or Guard Periods: for a power step $\Delta P \leq 1$ dB, the relative power tolerance for transmission is $\pm 0.7$ dB. |                                                               |                                                                                          |            |

### 6.3.4.4 Aggregate power tolerance

The aggregate power control tolerance is the ability of the UE transmitter to maintain its power in a sub-frame (1 ms) during non-contiguous transmissions within 21 ms in response to 0 dB commands with respect to the first UE transmission and all other power control parameters as specified in TS 38.213 [8] kept constant.

The minimum requirement specified in Table 6.3.4.4-1 apply in the power range bounded by the minimum output power as specified in clause 6.3.1 and the maximum output power as specified in clause 6.2.1.

**Table 6.3.4.4-1: Aggregate power tolerance**

| TPC command | UL channel | Aggregate power tolerance within 21 ms |
|-------------|------------|----------------------------------------|
| 0 dB        | PUCCH      | $\pm 2.5$ dB                           |
| 0 dB        | PUSCH      | $\pm 3.5$ dB                           |

## 6.3A Output power dynamics for CA

### 6.3A.1 Minimum output power for CA

#### 6.3A.1.1 Minimum output power for intra-band contiguous CA

For intra-band contiguous carrier aggregation, the minimum output power is defined per carrier and the requirement is specified in clause 6.3.1.

### 6.3A.1.2 Minimum output power for intra-band non-contiguous CA

For intra-band non-contiguous carrier aggregation, the minimum output power is defined per carrier and the requirement is specified in clause 6.3.1.

### 6.3A.1.3 Minimum output power for inter-band CA

For inter-band carrier aggregation with one uplink carrier assigned to one NR band, the minimum output power requirements in clause 6.3.1 apply.

For inter-band carrier aggregation with two uplink contiguous carrier assigned to one NR band, the minimum output power requirements in subclause 6.3A.1.1 apply for those carriers. For inter-band carrier aggregation with uplink assigned to two NR bands, the minimum output power is defined per carrier and the requirement is specified in clause 6.3.1.

For inter-band carrier aggregation with two uplink non-contiguous carrier assigned to one NR band, the minimum output power requirements in subclause 6.3A.1.2 apply for those carriers.

For inter-band carrier aggregation with uplink assigned to two NR bands, the minimum output power is defined per carrier and the requirement is specified in clause 6.3.1.

For combinations of intra-band and inter-band carrier aggregation with three uplink component carriers (up to two contiguously aggregated carriers per operating band), the minimum output power requirements specified in subclause 6.3.1 apply for the NR band supporting one component carrier, and for the NR band supporting two contiguous component carriers the requirements specified in subclause 6.3A.1.1 apply.

### 6.3A.1.4 Void

## 6.3A.2 Transmit OFF power for CA

### 6.3A.2.1 Transmit OFF power for intra-band contiguous CA

For intra-band contiguous carrier aggregation, the transmit OFF power specified in clause 6.3.2 is applicable for each component carrier when the transmitter is OFF on all component carriers. The transmitter is considered to be OFF when the UE is not allowed to transmit on any of its ports.

### 6.3A.2.2 Transmit OFF power for intra-band non-contiguous CA

For intra-band non-contiguous carrier aggregation, the transmit OFF power specified in clause 6.3.2 is applicable for each component carrier when the transmitter is OFF on all component carriers. The transmitter is considered to be OFF when the UE is not allowed to transmit on any of its ports.

### 6.3A.2.3 Transmit OFF power for inter-band CA

For inter-band carrier aggregation with one uplink carrier assigned to one NR band, the transmit OFF power requirements in subclause 6.3.2 apply.

For inter-band carrier aggregation with two contiguous carriers assigned to one NR band, the transmit OFF power requirements in subclause 6.3A.2.1 apply for those carriers.

For inter-band carrier aggregation with two uplink non-contiguous carrier assigned to one NR band, the transmit OFF power requirements in subclause 6.3A.2.2 apply for those carriers.

For inter-band carrier aggregation with uplink assigned to two NR bands, the transmit OFF power specified in clause 6.3.2 is applicable for each component carrier when the transmitter is OFF on all component carriers. The transmitter is considered to be OFF when the UE is not allowed to transmit on any of its ports.

For combinations of intra-band and inter-band carrier aggregation with three uplink component carriers (up to two contiguously aggregated carriers per operating band), the transmit OFF power requirements specified in subclause 6.3.2

apply for the NR band supporting one component carrier, and for the NR band supporting two contiguous component carriers the requirements specified in subclause 6.3A.2.1 apply.

#### 6.3A.2.4 Void

### 6.3A.3 Transmit ON/OFF time mask for CA

#### 6.3A.3.1 Transmit ON/OFF time mask for intra-band contiguous CA

For intra-band contiguous carrier aggregation, the general output power ON/OFF time mask specified in clause 6.3.3.1 is applicable for each component carrier during the ON power period and the transient periods. The OFF period as specified in clause 6.3.3.1 shall only be applicable for each component carrier when all the component carriers are OFF.

#### 6.3A.3.2 Transmit ON/OFF time mask for intra-band non-contiguous CA

For intra-band non-contiguous carrier aggregation, the general output power ON/OFF time mask specified in clause 6.3.3.1 is applicable for each component carrier during the ON power period and the transient periods. The OFF period as specified in clause 6.3.3.1 shall only be applicable for each component carrier when all the component carriers are OFF.

#### 6.3A.3.3 Transmit ON/OFF time mask for inter-band CA

##### 6.3A.3.3.1 General

For inter-band carrier aggregation with one uplink carrier assigned to one NR band, the transmit ON/OFF time mask requirements in subclause 6.3.3 apply.

For inter-band carrier aggregation with two contiguous carriers assigned to one NR band, the transmit ON/OFF time mask requirements in subclause 6.3A.3.1 apply for those carriers.

For inter-band carrier aggregation with two uplink non-contiguous carrier assigned to one NR band, the transmit ON/OFF time mask requirements in subclause 6.3A.3.2 apply for those carriers.

For inter-band carrier aggregation with uplink assigned to two NR bands, the general output power ON/OFF time mask specified in clause 6.3.3.1 is applicable for each component carrier during the ON power period and the transient periods. The OFF period as specified in clause 6.3.3.1 shall only be applicable for each component carrier when all the component carriers are OFF.

For combinations of intra-band and inter-band carrier aggregation with three uplink component carriers (up to two contiguously aggregated carriers per operating band), the transmit ON/OFF time mask requirements specified in subclause 6.3.3.1 apply for the NR band supporting one component carrier, and for the NR band supporting two contiguous component carriers the requirements specified in subclause 6.3A.3.1 apply.

Time masks for Tx switching due to switching period are defined in clauses 6.3A.3.3.2-6.3A.3.3.5 for both single TAG and dual-TAG scenarios. When a UE is configured with dual-TAG with at least two cells corresponding to two TAGs involved in one switching event, the timing advance difference should be considered in the time masks in sub-clauses 6.3A.3.3.2-6.3A.3.3.5 for two uplink carriers or two uplink bands. The UE may omit uplink transmission on OFDM symbols that partially or fully overlap with the configured switching period for any timing advance difference.

When the location of the switching period by *uplinkTxSwitchingPeriodLocation* is ignored by the UE, the length and location of allowed transient periods for dual TAG are as specified in 6.3A.3.3.2 – 6.3A.3.3.5 with the UE scheduled or configured with uplink transmissions that do not result in

- simultaneous transmission on two antenna ports on one uplink carrier on one band, and any transmission on another uplink carrier on another band
- transmission of any of the carriers for a duration of at least the uplink switching gap indicated by UE capability

for any timing difference between uplink carriers in different bands up to the MTTD specified for UL CA in clause 7.5.4 of [7] in case of dual TAG.

Carriers within the same band belong to the same TAG in all cases.

### 6.3A.3.3.2 Time mask for switching between two uplink carriers

In addition to the requirements in 6.3A.3.3.1 and the maximum output power requirement specified in Table 6.2A.1.3-1 with uplink assigned to two NR bands, the switching time mask specified in this clause is applicable for an uplink band pair of a inter-band UL CA configuration when the capability *uplinkTxSwitchingPeriod* is present, and is only applicable for uplink switching mechanisms specified in clause 6.1.6 of TS 38.214 [10], where NR UL carrier 1 is capable of one transmit antenna connector and NR UL carrier 2 is capable of two transmit antenna connectors with 3dB boosting on the maximum output power for CA power class 3 when the capability *uplinkTxSwitching-PowerBoosting* is present and the IE *uplinkTxSwitchingPowerBoosting* is enabled, and the two uplink carriers are in different bands with different carrier frequencies. The UE shall support the switch between single layer transmission with one antenna port and two-layer transmission with two antenna ports on the two uplink carriers following the scheduling commands and rank adaptation, i.e., both single layer and two-layer transmission with 2 antenna ports, and single layer transmission with 1 antenna port shall be supported on NR UL carrier 2 as specified in [38.306].

The switching periods described in Figure 6.3A.3.3.2-1a and Figure 6.3A.3.3.2-1b are located in either NR carrier 1 or carrier 2 as indicated in RRC signalling *uplinkTxSwitchingPeriodLocation* [7], and the length of uplink switching period  $X$  is less than the value indicated by UE capability *uplinkTxSwitchingPeriod*.

When switching from one carrier to another, if there is no uplink transmission scheduled or configured on the switch-from carrier for at least the duration of the switching period ( $X \mu\text{s}$ ) before the point in time the UE is scheduled or configured to start the transmission on the switch-to carrier, the switching period is fully contained in the time period between the end of the transmission on the switch-from carrier and the start of the transmission on the switch-to carrier. In addition, the RRC signalling *uplinkTxSwitchingPeriodLocation* is ignored by the UE and does not take effect in this case.

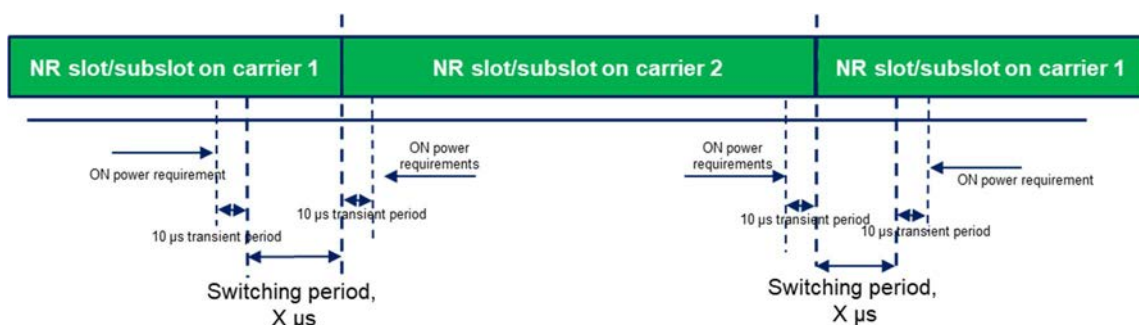


Figure 6.3A.3.3.2-1a: Time mask for switching between UL carrier 1 and UL Carrier 2, where the switching period is located in carrier 1

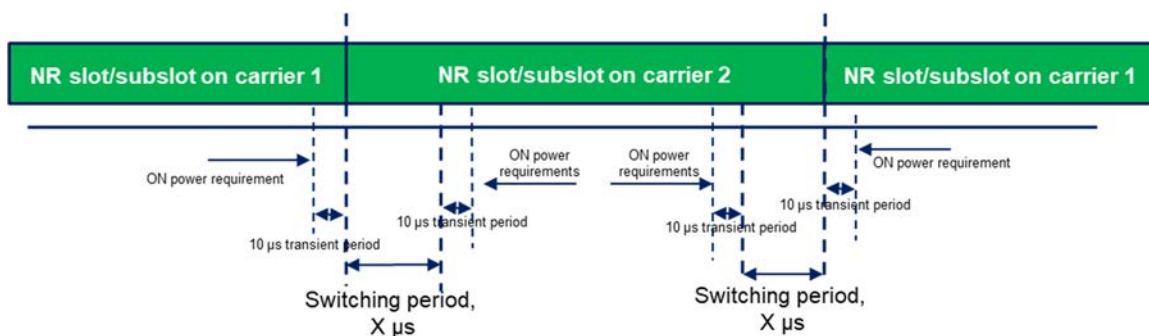


Figure 6.3A.3.3.2-1b: Time mask for switching between UL carrier 1 and UL Carrier 2, where the switching period is located in carrier 2

The following applies for the uplink switching cases specified in clause 6.1.6.2 of [10] with *uplinkTxSwitchingOption* set to either *switchedUL* or *dualUL* when the configuration of the location of the switching period by *uplinkTxSwitchingPeriodLocation* is ignored by the UE:

- if an uplink switching is triggered for an uplink transmission starting at  $T_0$  based on higher layer configuration(s) or DCI(s) received before  $T_0 - T_{offset}$  as specified in [10] and the UE is not configured or scheduled with uplink transmissions for a duration of at least the uplink switching gap indicated by *uplinkTxSwitchingPeriod* on any of the carriers before  $T_0$ , transient periods of 10  $\mu$ s are located at the end of the last symbol(s) configured or scheduled on the carriers before  $T_0$  and at the start of the first symbol(s) configured or scheduled at  $T_0$  on the switched-to carrier.

The requirements apply for the case of both non-co-located and co-located and synchronized network deployment for the two uplink carriers.

The time mask is applicable to uplink transmissions when configured with *switchedUL* or *dualUL*.

### 6.3A.3.3.3 Time mask for switching between two uplink carriers with two transmit antenna connectors

In addition to the requirements in 6.3A.3.3.1 and the maximum output power requirement specified in Table 6.2A.1.3-1 with uplink assigned to two NR bands, the switching time mask specified in this clause is applicable for an uplink band pair of a inter-band UL CA configuration when the capability *uplinkTxSwitchingPeriod2T2T* is present, and is only applicable for uplink switching mechanisms specified in clause 6.1.6 of TS 38.214 [10], where NR UL carrier 1 is capable of two transmit antenna connectors and NR UL carrier 2 is capable of two transmit antenna connectors, and the two uplink carriers are in different bands with different carrier frequencies. The UE shall support the switch between two-layer transmission with two antenna ports and two-layer transmission with two antenna ports on the two uplink carriers following the scheduling commands and rank adaptation, i.e., both single layer and two-layer transmission with 2 antenna ports, and single layer transmission with 1 antenna port shall be supported on NR UL carrier 1 and carrier 2.

The switching periods described in Figure 6.3A.3.3.3-1a and Figure 6.3A.3.3.3-1b are located in either NR carrier 1 or carrier 2 as indicated in RRC signalling *uplinkTxSwitchingPeriodLocation* [7], and the length of uplink switching period  $X$  is less than the value indicated by UE capability *uplinkTxSwitchingPeriod2T2T*.

When switching from one carrier to another, if there is no uplink transmission scheduled or configured on the switch-from carrier for at least the duration of the switching period ( $X \mu$ s) before the point in time the UE is scheduled or configured to start the transmission on the switch-to carrier, the switching period is fully contained in the time period between the end of the transmission on the switch-from carrier and the start of the transmission on the switch-to carrier. In addition, the RRC signalling *uplinkTxSwitchingPeriodLocation* is ignored by the UE and does not take effect in this case.

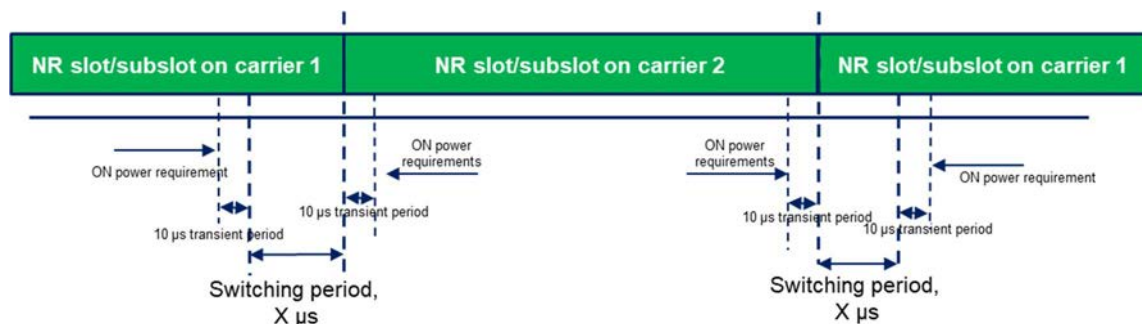


Figure 6.3A.3.3.3-1a: Time mask for switching between UL carrier 1 and UL Carrier 2, where the switching period is located in carrier 1

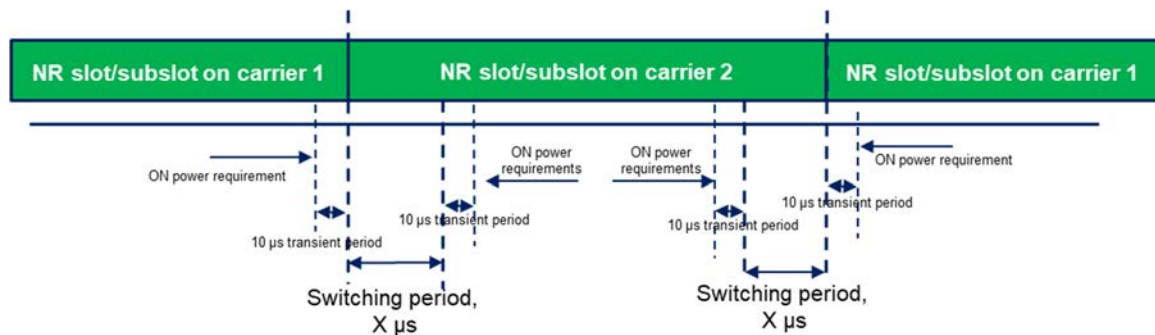


**Figure 6.3A.3.3.3-1b: Time mask for switching between UL carrier 1 and UL Carrier 2, where the switching period is located in carrier 2**

The following applies for the uplink switching cases specified in clause 6.1.6.2 of [10] with *uplinkTxSwitchingOption* set to either *switchedUL* or *dualUL* when the configuration of the location of the switching period by *uplinkTxSwitchingPeriodLocation* is ignored by the UE:

- if an uplink switching is triggered for an uplink transmission starting at  $T_0$  based on higher layer configuration(s) or DCI(s) received before  $T_0 - T_{offset}$  as specified in [10] and the UE is not configured or scheduled with uplink transmissions for a duration of at least the uplink switching gap indicated by *uplinkTxSwitchingPeriod2T2T* on any of the carriers before  $T_0$ , transient periods of  $10\ \mu\text{s}$  are located at the end of the last symbol(s) configured or scheduled on the carriers before  $T_0$  and at the start of the first symbol(s) configured or scheduled at  $T_0$  on the switched-to carrier.

The requirements apply for the case of both non-co-located and co-located and synchronized network deployment for the two uplink carriers.

The time mask is applicable to uplink transmissions when configured with *switchedUL* or *dualUL*.

#### 6.3A.3.3.4 Time mask for switching between one uplink band with one transmit antenna connector and one uplink band with two transmit antenna connectors

In addition to the requirements in 6.3A.3.3.1 and the maximum output power requirement specified in Table 6.2A.1.3-1 with uplink assigned to two NR bands, the switching time mask specified in this clause is applicable for an uplink band pair of a inter-band UL CA configuration when the capability *uplinkTxSwitchingPeriod* is present, and is only applicable for uplink switching mechanisms specified in clause 6.1.6 of TS 38.214 [10], where NR UL carrier 1 in band A is capable of one transmit antenna connector, NR UL carrier 2 and carrier 3 in band B are capable of two transmit antenna connectors. NR UL carrier 2 and carrier 3 are two contiguous aggregated carriers, and band A and band B are different bands with different carrier frequencies. The UE shall support the switch between single layer transmission with one antenna port and two-layer transmission with two antenna ports on the two uplink bands following the scheduling commands and rank adaptation, i.e., both single layer and two-layer transmission with 2 antenna ports, and single layer transmission with 1 antenna port shall be supported on NR UL carrier 2 and carrier 3 in band B.

The switching periods described in Figure 6.3A.3.3.4-1a and Figure 6.3A.3.3.4-1b are located in either NR band A or band B as indicated in RRC signalling *uplinkTxSwitchingPeriodLocation* [7], and the length of uplink switching period  $X$  is less than the value indicated by UE capability *uplinkTxSwitchingPeriod*.

When switching from one band to another, if there is no uplink transmission scheduled or configured on the switch-from band for at least the duration of the switching period ( $X\ \mu\text{s}$ ) before the point in time the UE is scheduled or configured to start the transmission on the switch-to band, the switching period is fully contained in the time period between the end of the transmission on the switch-from band and the start of the transmission on the switch-to band. In addition, the RRC signalling *uplinkTxSwitchingPeriodLocation* is ignored by the UE and does not take effect in this case.



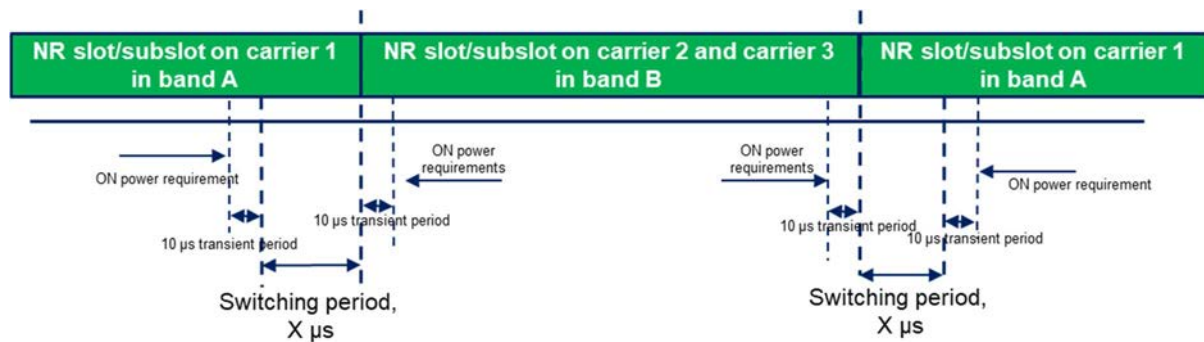


Figure 6.3A.3.3.4-1a: Time mask for switching between one carrier in band A and two contiguous carriers in band B, where the switching period is located in band A

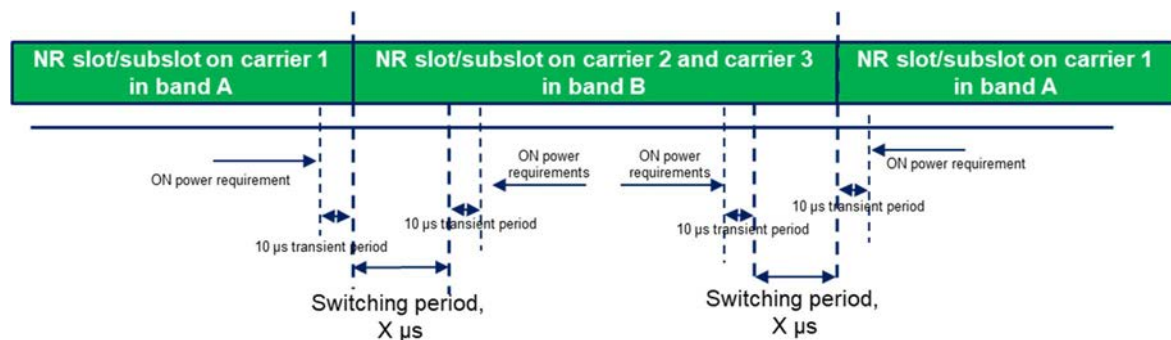


Figure 6.3A.3.3.4-1b: Time mask for switching between one carrier in band A and two contiguous carriers in band B, where the switching period is located in band B

The following applies for the uplink switching cases specified in clause 6.1.6.2 of [10] with *uplinkTxSwitchingOption* set to either *switchedUL* or *dualUL* when the configuration of the location of the switching period by *uplinkTxSwitchingPeriodLocation* is ignored by the UE:

- if an uplink switching is triggered for an uplink transmission starting at  $T_0$  based on higher layer configuration(s) or DCI(s) received before  $T_0 - T_{offset}$  as specified in [10] and the UE is not configured or scheduled with uplink transmissions for a duration of at least the uplink switching gap indicated by *uplinkTxSwitchingPeriod* on any of the carriers before  $T_0$ , transient periods of 10  $\mu$ s are located at the end of the last symbol(s) configured or scheduled on the carriers before  $T_0$  and at the start of the first symbol(s) configured or scheduled at  $T_0$  on the switched-to carrier.

The requirements apply for the case of both non-co-located and co-located and synchronized network deployment for the three uplink carriers.

The time mask is applicable to uplink transmissions when configured with *switchedUL* or *dualUL*.

### 6.3A.3.3.5 Time mask for switching between two uplink bands with two transmit antenna connectors

In addition to the requirements in 6.3A.3.3.1 and the maximum output power requirement specified in Table 6.2A.1.3-1 with uplink assigned to two NR bands, the switching time mask specified in this clause is applicable for an uplink band pair of a inter-band UL CA configuration when the capability *uplinkTxSwitchingPeriod2T2T* is present, and is only applicable for uplink switching mechanisms specified in clause 6.1.6 of TS 38.214 [10], where NR UL carrier 1 in band A is capable of two transmit antenna connectors, NR UL carrier 2 and carrier 3 in band B are capable of two transmit antenna connectors. NR UL carrier 2 and carrier 3 are two contiguous aggregated carriers, and band A and band B are different bands with different carrier frequencies. The UE shall support the switch between two-layer transmission with two antenna ports and two-layer transmission with two antenna ports on the two uplink bands following the scheduling



commands and rank adaptation, i.e., both single layer and two-layer transmission with 2 antenna ports, and single layer transmission with 1 antenna port shall be supported on NR UL carrier 1, carrier 2 and carrier 3 in the two bands.

The switching periods described in Figure 6.3A.3.3.5-1a and Figure 6.3A.3.3.5-1b are located in either NR band A or band B as indicated in RRC signalling *uplinkTxSwitchingPeriodLocation* [7], and the length of uplink switching period  $X$  is less than the value indicated by UE capability *uplinkTxSwitchingPeriod2T2T*.

When switching from one band to another, if there is no uplink transmission scheduled or configured on the switch-from band for at least the duration of the switching period ( $X \mu s$ ) before the point in time the UE is scheduled or configured to start the transmission on the switch-to band, the switching period is fully contained in the time period between the end of the transmission on the switch-from band and the start of the transmission on the switch-to band. In addition, the RRC signalling *uplinkTxSwitchingPeriodLocation* is ignored by the UE and does not take effect in this case.

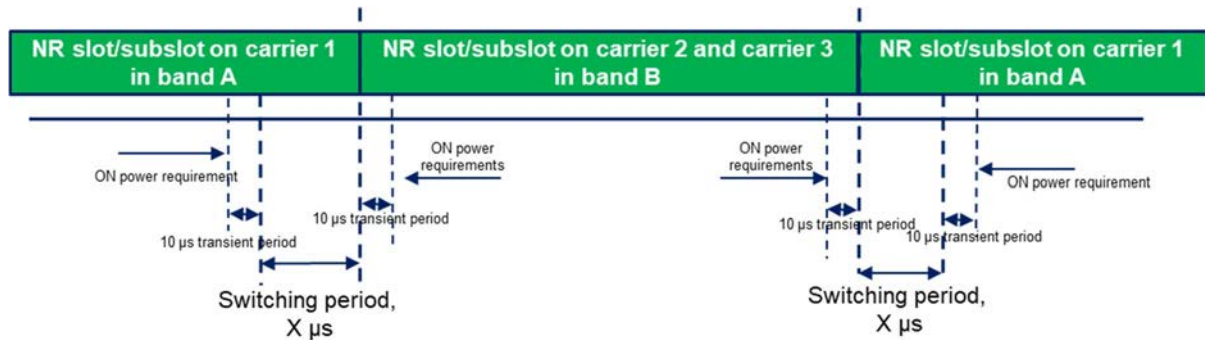


Figure 6.3A.3.3.5-1a: Time mask for switching between one carrier in band A and two contiguous carriers in band B, where the switching period is located in band A

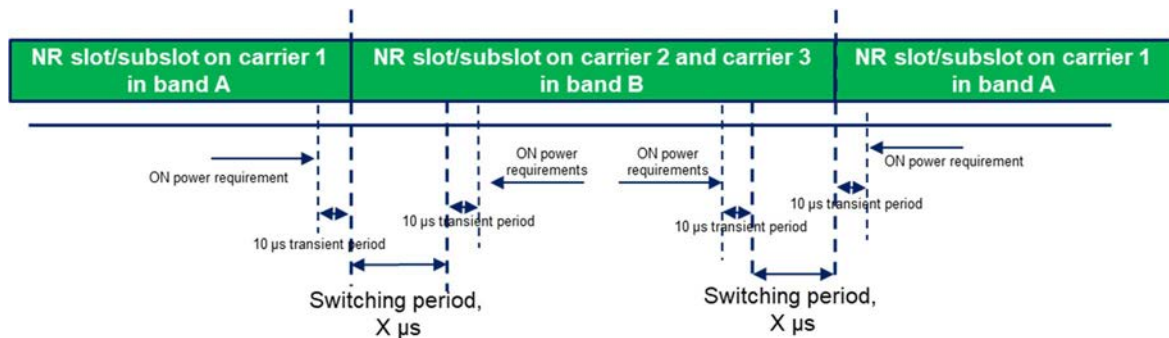


Figure 6.3A.3.3.5-1b: Time mask for switching between one carrier in band A and two contiguous carriers in band B, where the switching period is located in band B

The following applies for the uplink switching cases specified in clause 6.1.6.2 of [10] with *uplinkTxSwitchingOption* set to either *switchedUL* or *dualUL* when the configuration of the location of the switching period by *uplinkTxSwitchingPeriodLocation* is ignored by the UE:

- if an uplink switching is triggered for an uplink transmission starting at  $T_0$  based on higher layer configuration(s) or DCI(s) received before  $T_0 - T_{offset}$  as specified in [10] and the UE is not configured or scheduled with uplink transmissions for a duration of at least the uplink switching gap indicated by *uplinkTxSwitchingPeriod2T2T* on any of the carriers before  $T_0$ , transient periods of  $10 \mu s$  are located at the end of the last symbol(s) configured or scheduled on the carriers before  $T_0$  and at the start of the first symbol(s) configured or scheduled at  $T_0$  on the switched-to carrier.

The requirements apply for the case of both non-co-located and co-located and synchronized network deployment for the three uplink carriers.

The time mask is applicable to uplink transmissions when configured with *switchedUL* or *dualUL*.

#### 6.3A.3.4 Void

### 6.3A.4 Power control for CA

#### 6.3A.4.1 Power control for intra-band contiguous CA

##### 6.3A.4.1.1 Absolute power tolerance

The absolute power tolerance is the ability of the UE transmitter to set its initial output power to a specific value for the first sub-frame at the start of a contiguous transmission or non-contiguous transmission with a transmission gap on each active component carriers larger than 20ms. The requirement can be tested by time aligning any transmission gaps on the component carriers.

##### 6.3A.4.1.1.1 Minimum requirements

For intra-band contiguous carrier aggregation the absolute power control tolerance per component carrier is given in Table 6.3.4.2-1.

##### 6.3A.4.1.2 Relative power tolerance

##### 6.3A.4.1.2.1 Minimum requirements

For intra-band contiguous carrier aggregation, the requirements apply when the power of the target and reference sub-frames on each component carrier exceed the minimum output power as defined in clause 6.3A.1 and the total power is limited by  $P_{\text{UMAX}}$  as defined in clause 6.2A.4. The UE shall meet the following requirements for transmission on both assigned component carriers when the average transmit power per PRB is aligned across both assigned carriers in the reference sub-frame:

- a) for all possible combinations of PUSCH and PUCCH transitions per component carrier, the corresponding requirements given in Table 6.3.4.3-1;
- b) for SRS transitions on each component carrier, the requirements for combinations of PUSCH/PUCCH and SRS transitions given in Table 6.3.4.2-1 with simultaneous SRS of constant SRS bandwidth allocated in the target and reference subframes;
- c) for RACH on the primary component carrier, the requirements given in Table 6.3.4.3-1 for PRACH.

For a) and b) above, the power step  $\Delta P$  between the reference and target subframes shall be set by a TPC command and/or an uplink scheduling grant transmitted by means of an appropriate DCI Format.

##### 6.3A.4.1.3 Aggregate power control tolerance

For intra-band contiguous carrier aggregation, the aggregate power tolerance per component carrier is given in Table 6.3.4.4-1. The average power per PRB shall be aligned across both assigned carriers before the start of the test. The requirement can be tested with the transmission gaps time aligned between component carriers.

#### 6.3A.4.2 Power control for intra-band non-contiguous CA

##### 6.3A.4.2.1 Absolute power tolerance

The absolute power tolerance is the ability of the UE transmitter to set its initial output power to a specific value for the first sub-frame at the start of a contiguous transmission or non-contiguous transmission with a transmission gap on each active component carriers larger than 20ms. The requirement can be tested by time aligning any transmission gaps on the component carriers.

#### 6.3A.4.2.1.1 Minimum requirements

For intra-band non-contiguous carrier aggregation the absolute power control tolerance per component carrier is given in Table 6.3.4.2-1.

#### 6.3A.4.2.2 Relative power tolerance

##### 6.3A.4.2.2.1 Minimum requirements

For intra-band non-contiguous carrier aggregation, the requirements apply when the power of the target and reference sub-frames on each component carrier exceed the minimum output power as defined in subclause 6.3A.1 and the total power is limited by  $P_{\text{UMAX}}$  as defined in subclause 6.2A.4. The UE shall meet the following requirements for transmission on both assigned component carriers when the average transmit power per PRB is aligned across both assigned carriers in the reference sub-frame:

- a) for all possible combinations of PUSCH and PUCCH transitions per component carrier, the corresponding requirements given in Table 6.3.4.3-1;
- b) for SRS transitions on each component carrier, the requirements for combinations of PUSCH/PUCCH and SRS transitions given in Table 6.3.4.3-1 with simultaneous SRS of constant SRS bandwidth allocated in the target and reference subframes;
- c) for RACH on the primary component carrier, the requirements given in Table 6.3.4.3-1 for PRACH.

For a) and b) above, the power step  $\Delta P$  between the reference and target subframes shall be set by a TPC command and/or an uplink scheduling grant transmitted by means of an appropriate DCI Format.

#### 6.3A.4.2.3 Aggregate power control tolerance

For intra-band non-contiguous carrier aggregation, the aggregate power tolerance per component carrier is given in Table 6.3.4.4-1. The average power per PRB shall be aligned across both assigned carriers before the start of the test. The requirement can be tested with the transmission gaps time aligned between component carriers.

#### 6.3A.4.3 Power control for inter-band CA

No requirements unique to CA operation are defined.

#### 6.3A.4.4 Void

### 6.3B Output power dynamics for NR-DC

For inter-band NR-DC with one uplink carrier assigned per NR band, the output power dynamics for the corresponding inter-band CA configuration as specified in clause 6.3A applies.

### 6.3C Output power dynamics for SUL

#### 6.3C.1 Void

#### 6.3C.2 Void

#### 6.3C.3 Transmit ON/OFF time mask for SUL

##### 6.3C.3.1 Time mask for switching between two uplink carriers

The switching time mask specified in this clause is applicable for an uplink band pair of a SUL configuration when the capability *uplinkTxSwitchingPeriod* is present, is only applicable for uplink switching mechanisms specified in clause

6.16 of TS 38.214 [10], where NR SUL carrier 1 is capable of one transmit antenna connector and NR UL carrier 2 is capable of two transmit antenna connectors, and the two uplink carriers are in different bands with different carrier frequencies. The UE shall support the switch between single layer transmission with one antenna port and two-layer transmission with two antenna ports on the two uplink carriers following the scheduling commands and rank adaptation, i.e., both single layer and two-layer transmission with 2 antenna ports, and single layer transmission with 1 antenna port shall be supported on NR UL carrier 2.

The switching periods described in Figure 6.3C.3.1-1a and Figure 6.3C.3.1-1b are located in either NR carrier 1 or carrier 2 as indicated in RRC signalling *uplinkTxSwitchingPeriodLocation* [7], and the length of uplink switching period  $X$  is less than the value indicated by UE capability *uplinkTxSwitchingPeriod*.

When switching from one carrier to another, if there is no uplink transmission scheduled or configured on the switch-from carrier for at least the duration of the switching period ( $X \mu\text{s}$ ) before the point in time the UE is scheduled or configured to start the transmission on the switch-to carrier, the switching period is fully contained in the time period between the end of the transmission on the switch-from carrier and the start of the transmission on the switch-to carrier. In addition, the RRC signalling *uplinkTxSwitchingPeriodLocation* is ignored by the UE and does not take effect in this case.

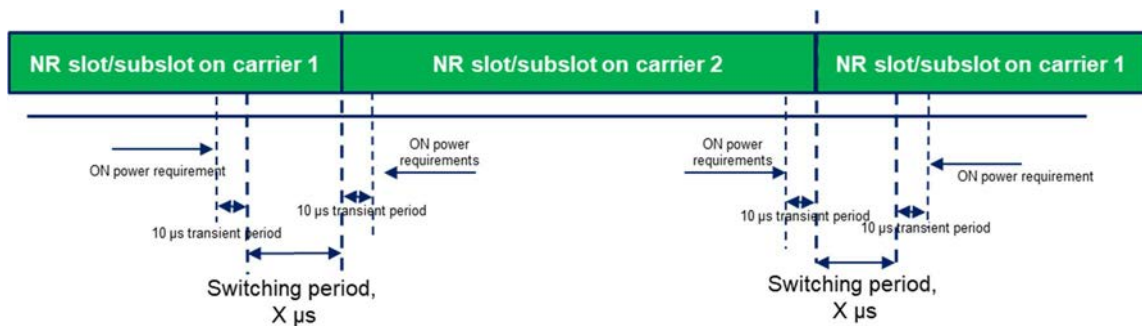


Figure 6.3C.3.1-1a: Time mask for switching between SUL carrier 1 and UL Carrier 2, where the switching period is located in carrier 1

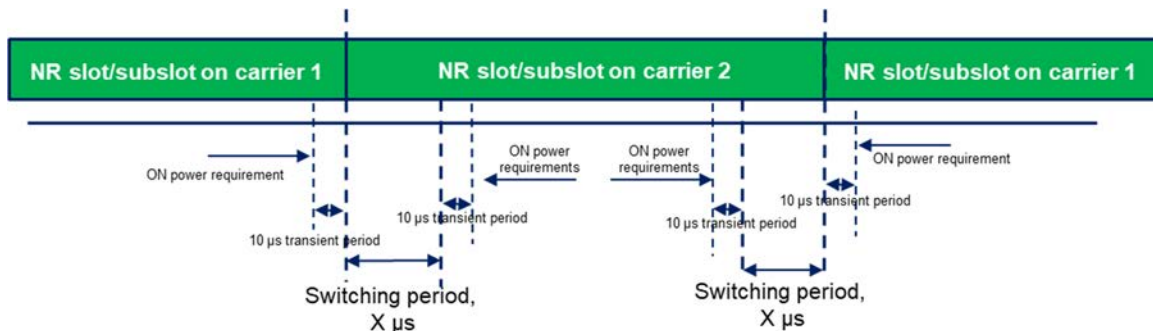


Figure 6.3C.3.1-1b: Time mask for switching between SUL carrier 1 and UL Carrier 2, where the switching period is located in carrier 2

The following applies for the uplink switching case specified in clause 6.1.6.3 of [10] when the configuration of the location of the switching period by *uplinkTxSwitchingPeriodLocation* is ignored by the UE:

- if an uplink switching is triggered for an uplink transmission starting at  $T_0$  based on higher layer configuration(s) or DCI(s) received before  $T_0 - T_{\text{offset}}$  as specified in [10] and the UE is not configured or scheduled with uplink transmissions for a duration of at least the uplink switching gap indicated by *uplinkTxSwitchingPeriod* on any of the carriers before  $T_0$ , transient periods of  $10 \mu\text{s}$  are located at the end of the last symbol(s) scheduled on the carriers before  $T_0$  and at the start of the first symbol(s) configured or scheduled at  $T_0$ .

The requirements apply for the case of co-located and synchronized network deployment for the two uplink carriers.

The requirements apply for the case of single TAG for the two uplink carriers, i.e., the same uplink timing for the two carriers as described in clause 4.2 of TS 38.213 [8].

### 6.3C.3.2 Time mask for switching between two uplink carriers with two transmit antenna connectors

The switching time mask specified in this clause is applicable for an uplink band pair of a SUL configuration when the capability *uplinkTxSwitchingPeriod2T2T* is present, is only applicable for uplink switching mechanisms specified in clause 6.1.6 of TS 38.214 [10], where NR SUL carrier 1 is capable of two transmit antenna connectors and NR UL carrier 2 is capable of two transmit antenna connectors, and the two uplink carriers are in different bands with different carrier frequencies. The UE shall support the switch between two-layer transmission with two antenna ports and two-layer transmission with two antenna ports on the two uplink carriers following the scheduling commands and rank adaptation, i.e., both single layer and two-layer transmission with 2 antenna ports, and single layer transmission with 1 antenna port shall be supported on NR UL carrier 1 and carrier 2.

The switching periods described in Figure 6.3C.3.2-1a and Figure 6.3C.3.2-1b are located in either NR carrier 1 or carrier 2 as indicated in RRC signalling *uplinkTxSwitchingPeriodLocation* [7], and the length of uplink switching period  $X$  is less than the value indicated by UE capability *uplinkTxSwitchingPeriod2T2T*.

When switching from one carrier to another, if there is no uplink transmission scheduled or configured on the switch-from carrier for at least the duration of the switching period ( $X \mu\text{s}$ ) before the point in time the UE is scheduled or configured to start the transmission on the switch-to carrier, the switching period is fully contained in the time period between the end of the transmission on the switch-from carrier and the start of the transmission on the switch-to carrier. In addition, the RRC signalling *uplinkTxSwitchingPeriodLocation* is ignored by the UE and does not take effect in this case.

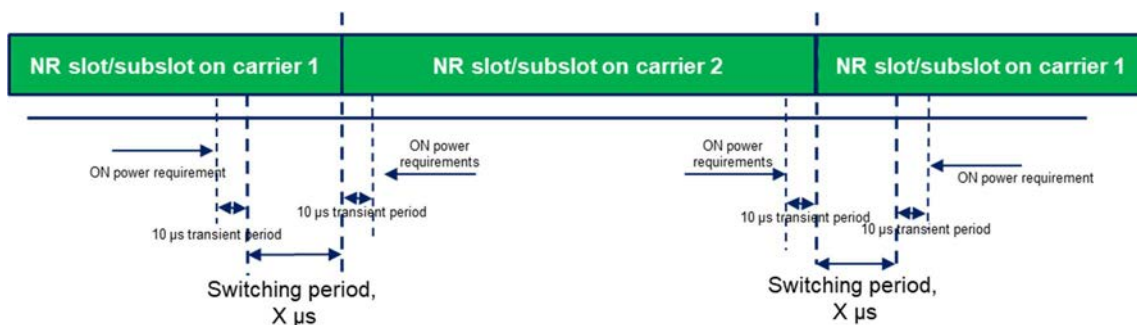


Figure 6.3C.3.2-1a: Time mask for switching between SUL carrier 1 and UL Carrier 2, where the switching period is located in carrier 1

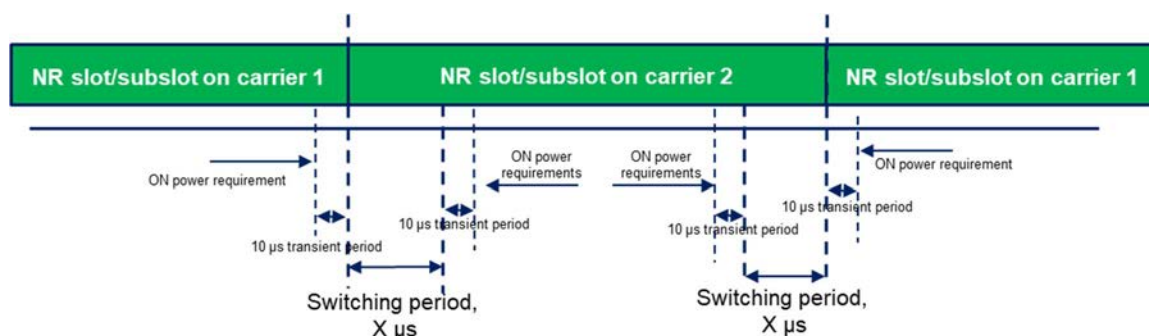


Figure 6.3C.3.2-1b: Time mask for switching between SUL carrier 1 and UL Carrier 2, where the switching period is located in carrier 2

The following applies for the uplink switching case specified in clause 6.1.6.3 of [10] when the configuration of the location of the switching period by *uplinkTxSwitchingPeriodLocation* is ignored by the UE:

- if an uplink switching is triggered for an uplink transmission starting at  $T_0$  based on higher layer configuration(s) or DCI(s) received before  $T_0 - T_{offset}$  as specified in [10] and the UE is not configured or scheduled with uplink transmissions for a duration of at least the uplink switching gap indicated by *uplinkTxSwitchingPeriod2T2T* on any of the carriers before  $T_0$ , transient periods of 10  $\mu$ s are located at the end of the last symbol(s) configured or scheduled on the carriers before  $T_0$  and at the start of the first symbol(s) configured or scheduled at  $T_0$ .

The requirements apply for the case of co-located and synchronized network deployment for the two uplink carriers.

The requirements apply for the case of single TAG for the two uplink carriers, i.e., the same uplink timing for the two carriers as described in clause 4.2 of TS 38.213 [8].

### 6.3C.3.3 Time mask for switching between one uplink band with one transmit antenna connector and one uplink band with two transmit antenna connectors

The switching time mask specified in this clause is applicable for an uplink band pair of a SUL configuration when the capability *uplinkTxSwitchingPeriod* is present, is only applicable for uplink switching mechanisms specified in clause 6.1.6 of TS 38.214 [10], where NR SUL carrier 1 in band A is capable of one transmit antenna connector and NR UL carrier 2 and carrier 3 in band B are capable of two transmit antenna connectors. NR UL carrier 2 and carrier 3 are two contiguous aggregated carriers, and band A and band B are different bands with different carrier frequencies. The UE shall support the switch between single layer transmission with one antenna port and two-layer transmission with two antenna ports on the two uplink bands following the scheduling commands and rank adaptation, i.e., both single layer and two-layer transmission with 2 antenna ports, and single layer transmission with 1 antenna port shall be supported on NR UL carrier 2 and carrier 3 in band B.

The switching periods described in Figure 6.3C.3.3-1a and Figure 6.3C.3.3-1b are located in either NR band A or band B as indicated in RRC signalling *uplinkTxSwitchingPeriodLocation* [7], and the length of uplink switching period  $X$  is less than the value indicated by UE capability *uplinkTxSwitchingPeriod*.

When switching from one band to another, if there is no uplink transmission scheduled or configured on the switch-from band for at least the duration of the switching period ( $X \mu$ s) before the point in time the UE is scheduled or configured to start the transmission on the switch-to band, the switching period is fully contained in the time period between the end of the transmission on the switch-from band and the start of the transmission on the switch-to band. In addition, the RRC signalling *uplinkTxSwitchingPeriodLocation* is ignored by the UE and does not take effect in this case.

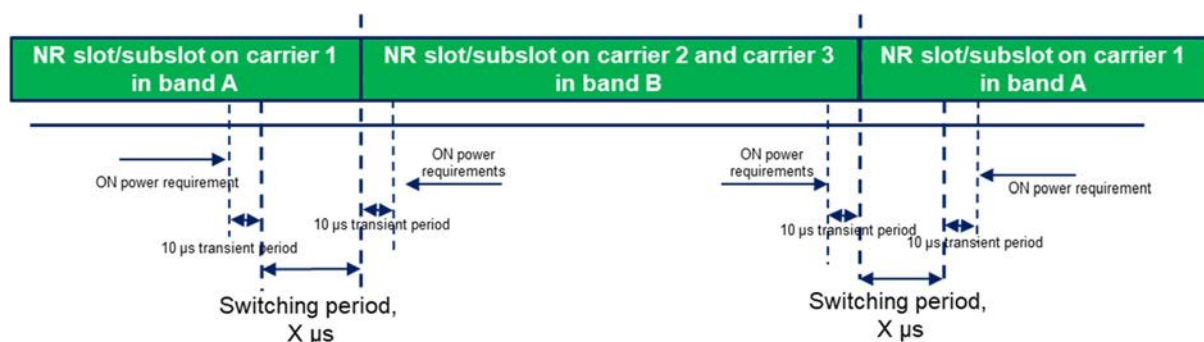


Figure 6.3C.3.3-1a: Time mask for switching between one carrier in band A and two contiguous carriers in band B, where the switching period is located in band A



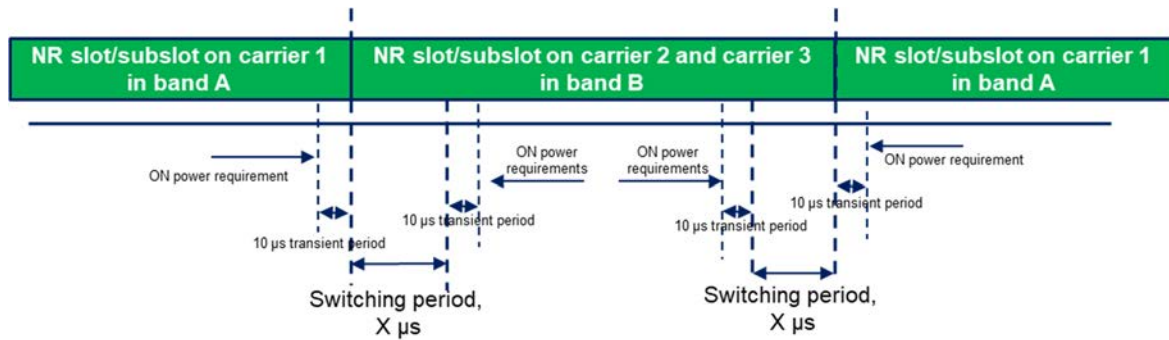


**Figure 6.3C.3.3-1b: Time mask for switching between one carrier in band A and two contiguous carriers in band B, where the switching period is located in band B**

The following applies for the uplink switching case specified in clause 6.1.6.3 of [10] when the configuration of the location of the switching period by *uplinkTxSwitchingPeriodLocation* is ignored by the UE:

- if an uplink switching is triggered for an uplink transmission starting at  $T_0$  based on higher layer configuration(s) or DCI(s) received before  $T_0 - T_{\text{offset}}$  as specified in [10] and the UE is not configured or scheduled with uplink transmissions for a duration of at least the uplink switching gap indicated by *uplinkTxSwitchingPeriod* on any of the carriers before  $T_0$ , transient periods of  $10\ \mu\text{s}$  are located at the end of the last symbol(s) configured or scheduled on the carriers before  $T_0$  and at the start of the first symbol(s) configured or scheduled at  $T_0$ .

The requirements apply for the case of co-located and synchronized network deployment for the three uplink carriers.

The requirements apply for the case of single TAG for the three uplink carriers, i.e., the same uplink timing for the three carriers as described in clause 4.2 of TS 38.213 [8].

#### 6.3C.3.4 Time mask for switching between two uplink bands with two transmit antenna connectors

The switching time mask specified in this clause is applicable for an uplink band pair of a SUL configuration when the capability *uplinkTxSwitchingPeriod2T2T* is present, is only applicable for uplink switching mechanisms specified in clause 6.1.6 of TS 38.214 [10], where NR SUL carrier 1 in band A is capable of two transmit antenna connectors and NR UL carrier 2 and carrier 3 in band B are capable of two transmit antenna connectors. NR UL carrier 2 and carrier 3 are two contiguous aggregated carriers, and band A and band B are different bands with different carrier frequencies. The UE shall support the switch between two-layer transmission with two antenna ports and two-layer transmission with two antenna ports on the two uplink bands following the scheduling commands and rank adaptation, i.e., both single layer and two-layer transmission with 2 antenna ports, and single layer transmission with 1 antenna port shall be supported on NR UL carrier 1, carrier 2 and carrier 3 in the two bands.

The switching periods described in Figure 6.3C.3.4-1a and Figure 6.3C.3.4-1b are located in either NR band A or band B as indicated in RRC signalling *uplinkTxSwitchingPeriodLocation* [7], and the length of uplink switching period  $X$  is less than the value indicated by UE capability *uplinkTxSwitchingPeriod2T2T*.

When switching from one band to another, if there is no uplink transmission scheduled or configured on the switch-from band for at least the duration of the switching period ( $X\ \mu\text{s}$ ) before the point in time the UE is scheduled or configured to start the transmission on the switch-to band, the switching period is fully contained in the time period between the end of the transmission on the switch-from band and the start of the transmission on the switch-to band. In addition, the RRC signalling *uplinkTxSwitchingPeriodLocation* is ignored by the UE and does not take effect in this case.

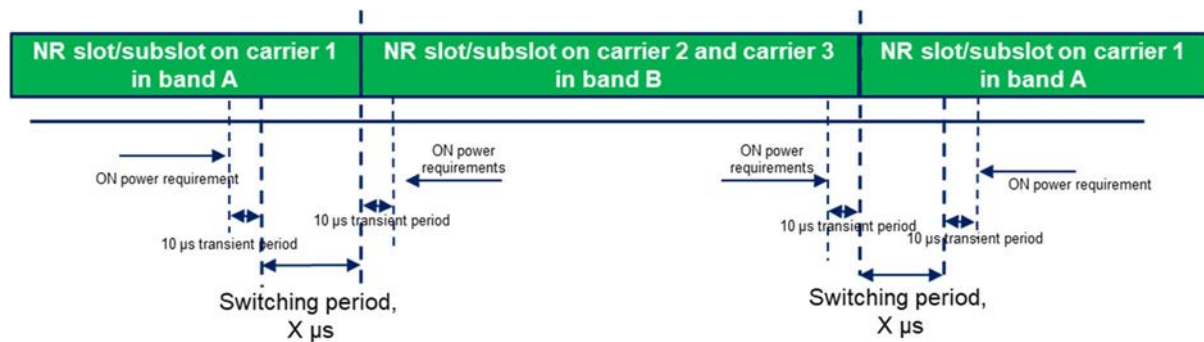


**Figure 6.3C.3.4-1a: Time mask for switching between one carrier in band A and two contiguous carriers in band B, where the switching period is located in band A**

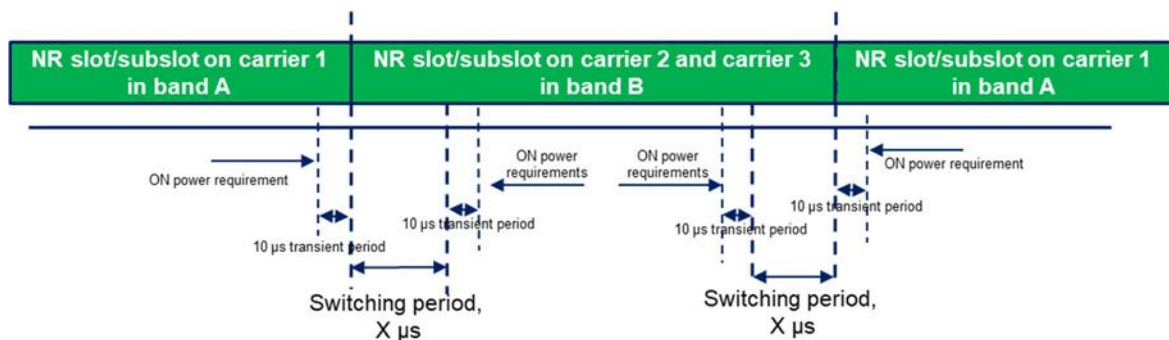


**Figure 6.3C.3.4-1b: Time mask for switching between one carrier in band A and two contiguous carriers in band B, where the switching period is located in band B**

The following applies for the uplink switching case specified in clause 6.1.6.3 of [10] when the configuration of the location of the switching period by *uplinkTxSwitchingPeriodLocation* is ignored by the UE:

- if an uplink switching is triggered for an uplink transmission starting at  $T_0$  based on higher layer configuration(s) or DCI(s) received before  $T_0 - T_{offset}$  as specified in [10] and the UE is not configured or scheduled with uplink transmissions for a duration of at least the uplink switching gap indicated by *uplinkTxSwitchingPeriod2T2T* on any of the carriers before  $T_0$ , transient periods of 10 µs are located at the end of the last symbol(s) configured or scheduled on the carriers before  $T_0$  and at the start of the first symbol(s) configured or scheduled at  $T_0$ .

The requirements apply for the case of co-located and synchronized network deployment for the three uplink carriers.

The requirements apply for the case of single TAG for the three uplink carriers, i.e., the same uplink timing for the three carriers as described in clause 4.2 of TS 38.213 [8].

## 6.3D Output power dynamics for UL MIMO

### 6.3D.1 Minimum output power for UL MIMO

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the minimum output power is defined as the sum of the mean power from both transmit connector in one sub-frame (1 ms). The minimum output power shall not exceed the values specified in Table 6.3.1-1.

If UE is scheduled for single antenna-port PUSCH transmission by DCI format 0\_0 or by DCI format 0\_1 for single antenna port codebook based transmission with precoding matrix  $W=1$  [6.3.1.5 TS 38.211], the requirements in clause 6.3.1 apply when  $TxD$  is not indicated, and the requirements in clause 6.3G.1 apply when  $TxD$  is indicated.



### 6.3D.2 Transmit OFF power for UL MIMO

The transmit OFF power is defined as the mean power at each transmit antenna connector in a duration of at least one sub-frame (1 ms) excluding any transient periods.

The transmit OFF power at each transmit antenna connector shall not exceed the values specified in Table 6.3.2-1.

### 6.3D.3 Transmit ON/OFF time mask for UL MIMO

For UE supporting UL MIMO, the ON/OFF time mask requirements in clause 6.3.3 apply at each transmit antenna connector.

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the general ON/OFF time mask requirements specified in clause 6.3.3.1 apply to each transmit antenna connector. The requirements shall be met with the UL MIMO configurations described in clause 6.2D.1.

If UE is scheduled for single antenna-port PUSCH transmission by DCI format 0\_0 or by DCI format 0\_1 for single antenna port codebook based transmission with precoding matrix  $W=1$  [6.3.1.5 TS 38.211], the requirements in clause 6.3.3 apply when  $TxD$  is not indicated, and the requirements in clause 6.3G.3 apply when  $TxD$  is indicated.

### 6.3D.4 Power control for UL MIMO

For UE supporting UL MIMO, the power control tolerance applies to the sum of output powers from both transmit antenna connector.

The power control requirements specified in clause 6.3.4 apply to UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme. The requirements shall be met with UL MIMO configurations described in clause 6.2D.1.

If UE is scheduled for single antenna-port PUSCH transmission by DCI format 0\_0 or by DCI format 0\_1 for single antenna port codebook based transmission with precoding matrix  $W=1$  [6.3.1.5 TS 38.211], the requirements in clause 6.3.4 apply when  $TxD$  is not indicated, and the requirements in clause 6.3G.4 apply when  $TxD$  is indicated.

## 6.3E Output power dynamics for V2X

### 6.3E.1 Minimum output power for V2X

#### 6.3E.1.1 General

When UE is configured for NR V2X sidelink transmissions non-concurrent with NR uplink transmissions for NR V2X operating bands in Table 5.2E.1-1, the minimum output power is specified in Table 6.3E.1.1-1. The minimum output power is defined as the mean power in at least one sub-frame 1 ms.

**Table 6.3E.1.1-1: Minimum output power**

| Channel bandwidth<br>(MHz)                          | Minimum output power<br>(dBm) | Measurement bandwidth<br>(MHz) |
|-----------------------------------------------------|-------------------------------|--------------------------------|
| 5 <sup>1</sup>                                      | -30                           | 4.515                          |
| 10                                                  | -30                           | 9.375                          |
| 20                                                  | -30                           | 19.095                         |
| 30                                                  | -28.2                         | 28.815                         |
| 40                                                  | -27                           | 38.895                         |
| Note 1: The CBW is only applicable to PS UE in n14. |                               |                                |

For NR V2X UE with two transmit antenna connectors, the minimum output power is defined as the sum of the mean power at each transmit connector in one sub-frame (1 ms). The minimum output power shall not exceed the values specified for single carrier.

If the UE transmits on one antenna connector at a time, the requirements specified for single carrier shall apply to the active antenna connector.

### 6.3E.1.2 Minimum output power for V2X concurrent operation

For the inter-band concurrent NR V2X operation, the requirements specified in clause 6.3.1 shall apply for the uplink in licensed band and the requirements specified in clause 6.3E.1.1 shall apply for the sidelink in licensed band or Band n47.

For intra-band concurrent NR V2X operation, the minimum output power is defined per carrier and the requirement for NR uplink is specified in clause 6.3.1 and the requirement for NR sidelink is specified in clause 6.3E.1, respectively.

## 6.3E.2 Transmit OFF power for V2X

### 6.3E.2.1 General

When UE is configured for NR V2X sidelink transmissions non-concurrent with NR uplink transmissions for NR V2X operating bands in Table 5.2E.1-1, the requirements specified in current clause apply.

**Table 6.3E.2.1-1: Transmit OFF power**

| Channel bandwidth<br>(MHz)                          | Transmit OFF power<br>(dBm) | Measurement bandwidth<br>(MHz) |
|-----------------------------------------------------|-----------------------------|--------------------------------|
| 5 <sup>1</sup>                                      | -50                         | 4.515                          |
| 10                                                  | -50                         | 9.375                          |
| 20                                                  | -50                         | 19.095                         |
| 30                                                  | -50                         | 28.815                         |
| 40                                                  | -50                         | 38.895                         |
| Note 1: The CBW is only applicable to PS UE in n14. |                             |                                |

For NR V2X UE supporting SL MIMO or Tx Diversity, the transmit OFF power at each transmit antenna connector shall not exceed the values specified in Table 6.3E.2.1-1 for single carrier. Transmit off power is defined as the mean power in at least one sub-frame 1 ms.

### 6.3E.2.2 Transmit OFF power for V2X concurrent operation

For the inter-band concurrent NR V2X operation, the requirements specified in clause 6.3.2 shall apply for the uplink in licensed band and the requirements specified in clause 6.3E.2.1 shall apply for the sidelink in licensed band or Band n47.

For intra-band concurrent NR V2X operation, the transmit OFF power requirement is defined per carrier and the requirement for NR uplink is specified in clause 6.3.2 and the requirement for NR sidelink is specified in clause 6.3E.2, respectively.

## 6.3E.3 Transmit ON/OFF time mask for V2X

### 6.3E.3.1 General

For NR V2X UE, additional requirements on ON/OFF time masks for V2X physical channels and signals are specified in this clause.

### 6.3E.3.2 General time mask

The General ON/OFF time mask defines the observation period between the Transmit OFF and ON power and between Transmit ON and OFF power for PSCCH, and PSSCH transmissions in a slot wherein the last symbol is punctured to create a guard period.

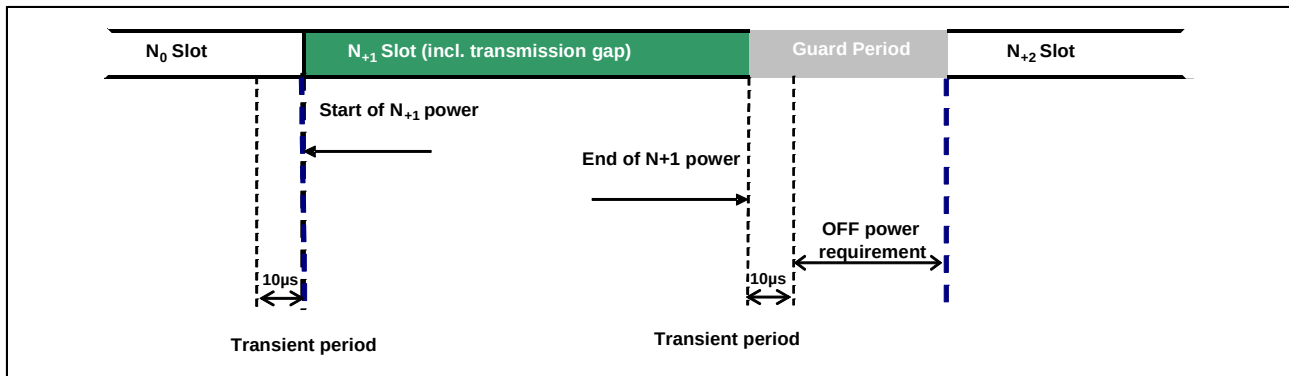


**Figure 6.3E.3.2-1: General PSCCH/PSSCH time mask for NR V2X UE**

For NR V2X UE supporting SL MIMO or Tx Diversity, the ON/OFF time mask requirements apply at each transmit antenna connector.

For UE with two transmit antenna connectors, the general ON/OFF time mask requirements specified in current subclause apply to each transmit antenna connector.

If the UE transmits on one antenna connector at a time, the general ON/OFF time mask requirements apply to the active antenna connector.

### 6.3E.3.3 S-SSB time mask

The S-PSS/S-SSS/PSBCH time mask for NR V2X UE defines the observation period between transmit OFF and ON S-PSS power and between transmit ON PSBCH and OFF power in a slot wherein the last symbol is punctured to create a guard period.

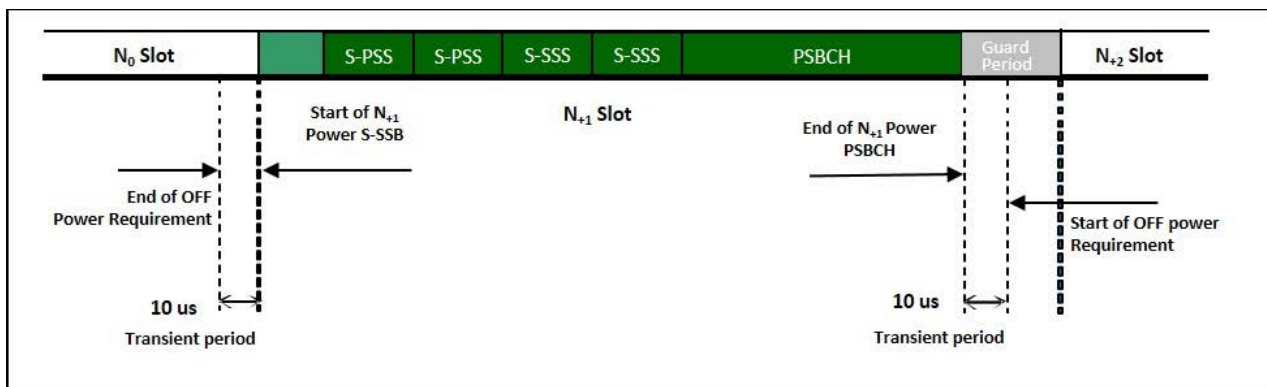


**Figure 6.3E.3.3-1: S-SSB time mask for NR V2X UE**

For NR V2X UE supporting SL MIMO or Tx Diversity, the ON/OFF time mask requirements apply at each transmit antenna connector.

For UE with two transmit antenna connectors, the S-SSB ON/OFF time mask requirements specified in current subclause apply to each transmit antenna connector.

If the UE transmits on one antenna connector at a time, the S-SSB ON/OFF time mask requirements apply to the active antenna connector.

### 6.3E.3.4 Transmit ON/OFF time mask for V2X concurrent operation

For the inter-band concurrent NR V2X operation, the requirements specified in clause 6.3.3 shall apply for the uplink in licensed band and the requirements specified in clause 6.3E.3.2 and 6.3E.3.3 shall apply for the sidelink in licensed band or Band n47.

For intra-band V2X concurrent operation band specified in subclause 5.2.E.2, the general output power ON/OFF time mask is defined per carrier during the ON power period and the transient periods. The ON/OFF time mask specified in clause 6.3.3.1 is applicable for NR uplink and the ON/OFF time mask in 6.3E.3.1 is applicable for NR sidelink. The OFF period as specified in clause 6.3.3.1 shall only be applicable for each component carrier when all the component carriers are OFF.

For the TDM operation in same carrier with same bandwidth, the switching time mask in Figure 6.3E.3.4-1 shall be applied.

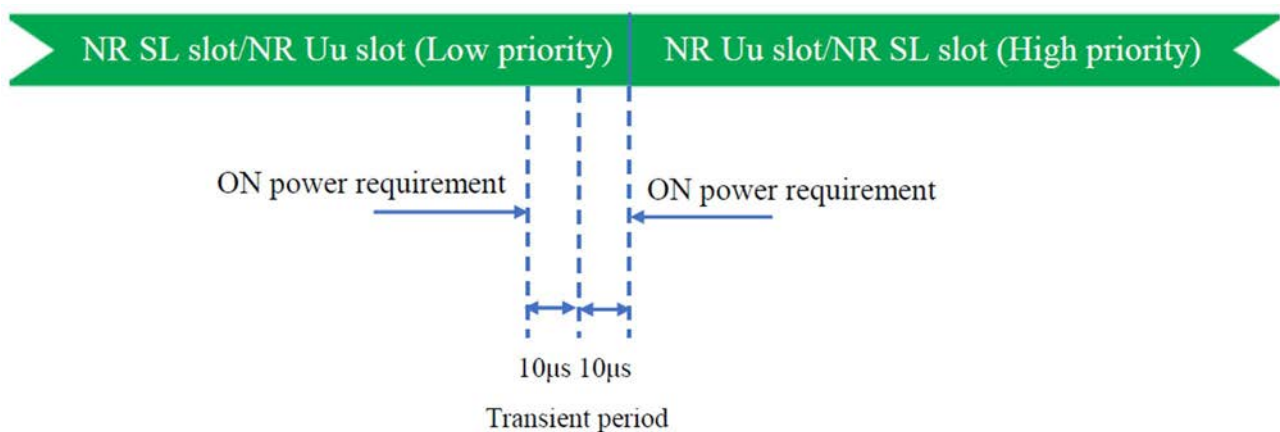


**Figure 6.3E.3.4-1: Time mask for switching between Uu and SL for same carrier case with same bandwidth**

For intra-band V2X concurrent operation band specified in subclause 5.3.E.2, the switching time mask in Figure 6.3E.3.4-2 shall apply for the different carrier case. The switching time shall be located on the RAT of low priority when NR Uu and NR SL have different priorities based on priority information specified in TS 38.321 and TS38.213. It is up to UE implementation when NR Uu and NR SL have the same priority based on priority information specified in TS 38.213.

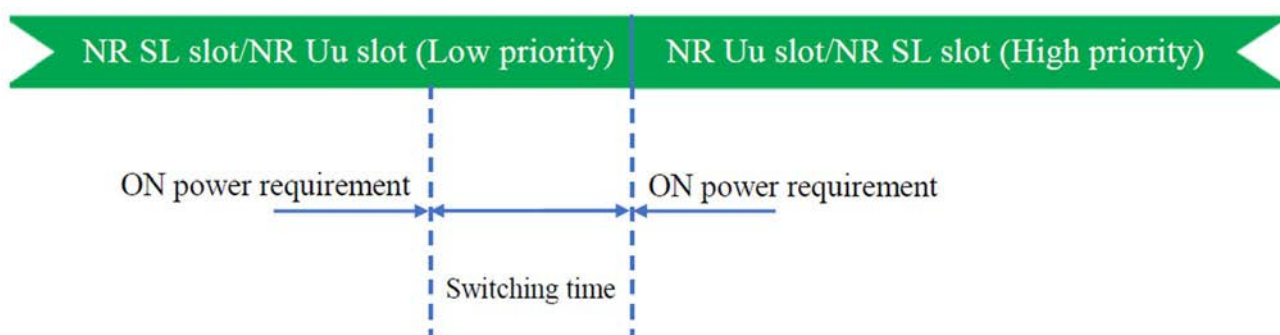


**Figure 6.3E.3.4-2: Time mask for switching between Uu and SL for different carrier case**

In the real field, there is a timing advance difference, i.e.  $N_{TA} \cdot T_c$  between NR Uu slot and NR SL slot due to different timing advance of NR Uu and NR SL. The switching time masks do not include timing advance difference but the timing advance difference should be considered with the switching time for same carrier case and different carrier case.

## 6.3E.4 Power control for V2X

### 6.3E.4.1 General

When UE is configured for NR V2X sidelink transmissions non-concurrent with NR uplink transmissions for NR V2X operating bands in Table 5.2E.1-1, the following requirements are applied for NR V2X sidelink transmission.

For NR V2X UE supporting SL MIMO or Tx Diversity, the power control tolerance for single carrier shall apply to the sum of output power at each transmit antenna connector.

If the UE transmits on one antenna connector at a time, the requirements for single carrier shall apply to the active antenna connector.

### 6.3E.4.2 Absolute power tolerance

The requirements in clause 6.3.4.2 shall apply for NR V2X transmission.

### 6.3E.4.3 Power control for V2X concurrent operation

For the inter-band concurrent NR V2X operation, the requirements specified in clause 6.3.4 shall apply for the uplink in licensed band and the requirements specified in clause 6.3E.4.1 and 6.3E.4.2 shall apply for the sidelink in licensed band or Band n47.

For the intra-band concurrent NR V2X operation, the requirements specified in clause 6.3.4 shall apply for the uplink in licensed band and the requirements specified in clause 6.3E.4 shall apply for the sidelink in licensed band.

## 6.3F Output power dynamics for shared spectrum channel access

### 6.3F.1 Minimum output power

The requirements for minimum output power in clause 6.3.1 apply.

### 6.3F.2 Transmit OFF power

The requirements for Transmit OFF power in clause 6.3.2 apply.

### 6.3F.3 Transmit ON/OFF time mask

#### 6.3F.3.1 General

The transmit power time mask defines the transient period(s) allowed between transmit OFF power as defined in clause 6.3F.2 and transmit ON power symbols (transmit ON/OFF). The transmit power ON/OFF time mask specified in clause 6.3F.3.2 supercedes the ON/OFF masks specified in clause 6.3.3; however, between continuous ON-power transmissions the requirements in clause 6.3.3 apply. Unless otherwise stated the requirements in clause 6.5F apply also in transient periods.

#### 6.3F.3.2 General ON/OFF time mask

The general ON/OFF time mask defines the observation period between transmit OFF and ON power and between transmit ON and OFF power for each SCS as illustrated below in Figure 6.3F.3.2-1. ON/OFF scenarios include: contiguous, and non-contiguous transmission, etc.

The OFF power measurement period is defined in a duration of at least one slot excluding any transient periods. The ON power is defined as the mean power over the duration of at least one slot excluding any transient period and non-

transmitted symbols. The leading transient period starts 5 $\mu$ s before the beginning of the first symbol of transmission and extends 10 $\mu$ s into the transmission including the CP extension if applicable. The trailing transient period starts 5 $\mu$ s before the end of transmission and extends 5 $\mu$ s beyond the end of transmission.

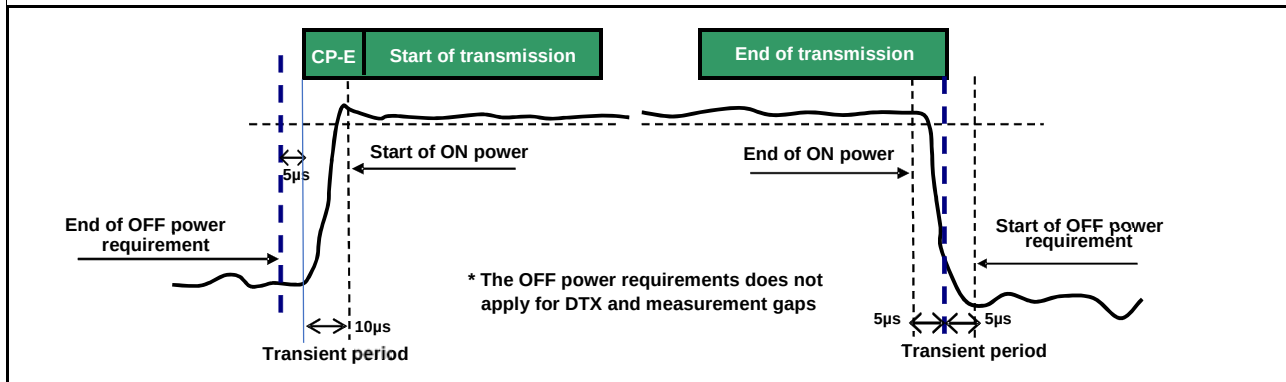


Figure 6.3F.3.2-1: General ON/OFF time mask for shared spectrum channel access

## 6.3F.3A General ON/OFF mask for CA

### 6.3F.3A.1 General ON/OFF mask for inter-band CA

For inter-band carrier aggregation with uplink assigned to two bands and including one of the bands listed in Table 6.2F.1-1, the general output power ON/OFF time mask specified in clause 6.3.3.1 is applicable for the NR uplink carrier while the general output power ON/OFF time mask specified in clause 6.3F.3 is applicable for the carrier operating with shared spectrum access. The OFF period as specified in clause 6.3.3.1 and clause 6.3F.3 shall only be applicable for each component carrier when all the component carriers are OFF.

## 6.3F.4 Power control

### 6.3F.4.1 General

The requirements on power control accuracy apply under normal conditions.

### 6.3F.4.2 Absolute power tolerance

The absolute power tolerance requirements of clause 6.3.4.2 apply at the start of a contiguous transmission or non-contiguous transmission with a transmission gap larger than 40 ms.

### 6.3F.4.3 Relative power tolerance

The relative power tolerance requirements of clause 6.3.4.3 apply if the transmission gap between the target sub-frame and the reference sub-frame is less than or equal to 40 ms.

### 6.3F.4.4 Aggregate power tolerance

The aggregate power tolerance requirements of clause 6.3.4.4 apply during non-contiguous transmissions within 41ms with respect to the first UE transmission.

## 6.3F.4A Power control for inter-band CA

No requirements unique to CA operation are defined.

## 6.3G Output power dynamics for Tx Diversity

### 6.3G.1 Minimum output power for Tx Diversity

For UE supporting Tx diversity, the minimum output power is defined as the sum of the mean power at each transmit connector in one sub-frame (1 ms). The minimum output power shall not exceed the values specified in Table 6.3.1-1.

### 6.3G.2 Transmit OFF power for Tx Diversity

For UE supporting Tx diversity, the transmit OFF power is defined as the mean power at each transmit antenna connector in a duration of at least one sub-frame (1 ms) excluding any transient periods.

The transmit OFF power at each transmit antenna connector shall not exceed the values specified in Table 6.3.2-1.

### 6.3G.3 Transmit ON/OFF time mask for Tx Diversity

For UE supporting Tx diversity, the ON/OFF time mask requirements in clause 6.3.3 apply at each transmit antenna connector.

### 6.3G.4 Power control for Tx Diversity

For UE supporting Tx diversity, the power control tolerance applies to the sum of output power at each transmit antenna connector.

The requirements specified in clause 6.3.4 apply.

## 6.3H Output power dynamics for CA with UL MIMO

### 6.3H.1 Output power dynamics for intra-band UL contiguous CA with UL MIMO

#### 6.3H.1.1 Minimum output power for intra-band UL contiguous CA with UL MIMO

For intra-band UL contiguous CA and UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the minimum output power is defined as the sum of the mean power from both transmit connector in one sub-frame (1 ms) on each CC. The minimum output power shall not exceed the values specified in clause 6.3A.1.1.

If UE is scheduled for single antenna-port PUSCH transmission by DCI format 0\_0 or by DCI format 0\_1 for single antenna port codebook based transmission with precoding matrix  $W=1$  [6.3.1.5 TS 38.211], the requirements in clause 6.3A.1.1 apply.

#### 6.3H.1.2 Transmit OFF power for intra-band UL contiguous CA with UL MIMO

The transmit OFF power is defined as the mean power at each transmit antenna connector in a duration of at least one sub-frame (1 ms) excluding any transient periods.

The transmit OFF power at each transmit antenna connector on each CC shall not exceed the values specified in clause 6.3A.2.1.

#### 6.3H.1.3 Transmit ON/OFF time mask for intra-band UL contiguous CA with UL MIMO

For UE supporting intra-band UL contiguous CA and UL MIMO, the ON/OFF time mask requirements in clause 6.3A.3.1 apply at each transmit antenna connector on each CC. The requirements shall be met with the UL MIMO configurations described in Table 6.2D.1-2.

If UE is scheduled for single antenna-port PUSCH transmission by DCI format 0\_0 or by DCI format 0\_1 for single antenna port codebook based transmission with precoding matrix  $W=1$  [6.3.1.5 TS 38.211], the requirements in clause 6.3A.3.1 apply.

### 6.3H.1.4 Power control for intra-band UL contiguous CA with UL MIMO

For UE supporting intra-band UL contiguous CA and UL MIMO, the power control tolerance in clause 6.3A.4.1 applies to the sum of output powers from both transmit antenna connector on each CC. The requirements shall be met with UL MIMO configurations described in Table 6.2D.1-2.

If UE is scheduled for single antenna-port PUSCH transmission by DCI format 0\_0 or by DCI format 0\_1 for single antenna port codebook based transmission with precoding matrix  $W=1$  [6.3.1.5 TS 38.211], the requirements in clause 6.3A.4.1 apply.

## 6.4 Transmit signal quality

### 6.4.1 Frequency error

The UE basic measurement interval of modulated carrier frequency is 1 UL slot. The mean value of basic measurements of UE modulated carrier frequency shall be accurate to within  $\pm 0.1$  PPM observed over a period of 1 ms of cumulated measurement intervals compared to the carrier frequency received from the NR Node B.

### 6.4.2 Transmit modulation quality

#### 6.4.2.0 General

Transmit modulation quality defines the modulation quality for expected in-channel RF transmissions from the UE. The transmit modulation quality is specified in terms of:

- Error Vector Magnitude (EVM) for the allocated resource blocks (RBs)
- EVM equalizer spectrum flatness derived from the equalizer coefficients generated by the EVM measurement process
- Carrier leakage
- In-band emissions for the non-allocated RB

All the parameters defined in clause 6.4.2 are defined using the measurement methodology specified in Annex F.

In case the parameter 3300 or 3301 is reported from UE via the parameter *txDirectCurrentLocation* in *UplinkTxDirectCurrentList* IE (as defined in TS 38.331 [7]), carrier leakage measurement requirement in clause 6.4.2.2 and 6.4.2.3 shall be waived, and the RF correction with regard to the carrier leakage and IQ image shall be omitted during the calculation of transmit modulation quality.

#### 6.4.2.1 Error Vector Magnitude

The Error Vector Magnitude is a measure of the difference between the reference waveform and the measured waveform. This difference is called the error vector. Before calculating the EVM the measured waveform is corrected by the sample timing offset and RF frequency offset. Then the carrier leakage shall be removed from the measured waveform before calculating the EVM.

The measured waveform is further equalised using the channel estimates subjected to the EVM equaliser spectrum flatness requirement specified in clause 6.4.2.4. For DFT-s-OFDM waveforms, the EVM result is defined after the front-end FFT and IDFT as the square root of the ratio of the mean error vector power to the mean reference power expressed as a %. For CP-OFDM waveforms, the EVM result is defined after the front-end FFT as the square root of the ratio of the mean error vector power to the mean reference power expressed as a %.



The basic EVM measurement interval in the time domain is one preamble sequence for the PRACH and one slot for PUCCH and PUSCH in the time domain. The EVM measurement interval is reduced by any symbols that contains an allowable power transient in the measurement interval, as defined in clause 6.3.3.

The RMS average of the basic EVM measurements over 10 subframes for the average EVM case, and over 60 subframes for the reference signal EVM case, for the different modulation schemes shall not exceed the values specified in Table 6.4.2.1-1 for the parameters defined in Table 6.4.2.1-2. For EVM evaluation purposes, all 13 PRACH preamble formats and all 5 PUCCH formats are considered to have the same EVM requirement as QPSK modulated.

Unless otherwise specified, pi/2 BPSK in this clause refers to both variants of pi/2 BPSK referenced in table 6.2.2-1.

**Table 6.4.2.1-1: Requirements for Error Vector Magnitude**

| Parameter | Unit | Average EVM Level |
|-----------|------|-------------------|
| Pi/2-BPSK | %    | 30                |
| QPSK      | %    | 17.5              |
| 16 QAM    | %    | 12.5              |
| 64 QAM    | %    | 8                 |
| 256 QAM   | %    | 3.5               |

**Table 6.4.2.1-2: Parameters for Error Vector Magnitude**

| Parameter                   | Unit | Level                   |
|-----------------------------|------|-------------------------|
| UE Output Power             | dBm  | ≥ Table 6.3.1-1         |
| UE Output Power for 256 QAM | dBm  | ≥ Table 6.3.1-1 + 10 dB |
| Operating conditions        |      | Normal conditions       |

#### 6.4.2.1a Error Vector Magnitude including symbols with transient period

In 6.4.2.1, EVM has been defined by excluding the symbols which have a transient period. In this section, measurement interval is defined for the symbols with a transient period to include these symbols in the RMS average EVM computation when the UE reports a transient period capability other than the default. Before calculating the EVM, the measured waveform is corrected for sample timing offset and RF frequency offset. Then the carrier leakage shall be removed from the measured waveform before calculating the EVM. The symbols with transient period should not be used for equalization. Only CP-OFDM waveform is used for conformance testing.

In the case of PUSCH or PUCCH transmissions when the mean power, modulation or RB allocation across slot or subslot boundaries is expected to change the EVM result over the symbols where the transient occurs is calculated according to Table 6.4.2.1a-1.

**Table 6.4.2.1a-1: EVM definition for reported transient period**

| Reported transient capability (us)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | EVM definition                                                                                                                  | $tp_{start}$ (μs) | SCS <sup>4</sup>            |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|-------------------|-----------------------------|
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | $EVM_{after} = \max(\overline{EVM_{l,tp}}, \overline{EVM_h})$<br>$EVM_{before} = \max(\overline{EVM_l}, \overline{EVM_{h,tp}})$ | -0.5              | 15kHz or 30kHz <sup>5</sup> |
| 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | $EVM_{after} = \max(\overline{EVM_{l,tp}}, \overline{EVM_h})$<br>$EVM_{before} = \max(\overline{EVM_l}, \overline{EVM_{h,tp}})$ | -1                | 15kHz                       |
| 7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | $EVM_{after} = \min(\overline{EVM_{l,tp}}, \overline{EVM_h})$<br>$EVM_{before} = \max(\overline{EVM_l}, \overline{EVM_{h,tp}})$ | -2.7              | 15kHz                       |
| NOTE 1: $\overline{EVM_l}$ , $\overline{EVM_h}$ , $\overline{EVM_{l,tp}}$ , and $\overline{EVM_{h,tp}}$ are defined in Annex F<br>NOTE 2: $EVM_{after}$ is the EVM for a symbol right after a transition; $EVM_{before}$ is the EVM for a symbol right before a transition<br>NOTE 3: $tp_{start}$ denotes the start position of the EVM exclusion window as shown in Annex F.4<br>NOTE 4: SCS denotes the SCS that can be used in the conformance test<br>NOTE 5: 30kHz shall be used in the conformance test unless the UE signals in <i>supportedSubCarrierSpacingUL</i> in <i>FeatureSetPerCC</i> that it only supports 15kHz in the corresponding band |                                                                                                                                 |                   |                             |

The RMS average of the basic EVM measurements over 108 subframes calculated only on the symbols where the transient occurs for the different modulation schemes shall not exceed the values specified in Table 6.4.2.1a-2 for the parameters defined in Table 6.4.2.1a-3. This requirement can be verified with 64 QAM and 256 QAM modulation.

**Table 6.4.2.1a-2: Requirements for Error Vector Magnitude**

| Parameter | Unit | Average EVM Level |
|-----------|------|-------------------|
| 64 QAM    | %    | 10                |
| 256 QAM   | %    | 8                 |

**Table 6.4.2.1a-3: Parameters for Error Vector Magnitude**

| Parameter                   | Unit | Level                        |
|-----------------------------|------|------------------------------|
| UE Output Power             | dBm  | $\geq$ Table 6.3.1-1         |
| UE Output Power for 256 QAM | dBm  | $\geq$ Table 6.3.1-1 + 10 dB |
| Operating conditions        |      | Normal conditions            |

## 6.4.2.2 Carrier leakage

Carrier leakage is an additive sinusoid waveform whose frequency is the same as the modulated waveform carrier frequency. The measurement interval is one slot in the time domain.

In the case that uplink sharing, the carrier leakage may have 7.5 kHz shift with the carrier frequency.

The relative carrier leakage power is a power ratio of the additive sinusoid waveform and the modulated waveform. The relative carrier leakage power shall not exceed the values specified in Table 6.4.2.2-1.

**Table 6.4.2.2-1: Requirements for Carrier Leakage**

| Parameter                               | Relative Limit (dBc) |
|-----------------------------------------|----------------------|
| Output power > 10 dBm                   | -28                  |
| 0 dBm $\leq$ Output power $\leq$ 10 dBm | -25                  |
| -30 dBm $\leq$ Output power < 0 dBm     | -20                  |
| -40 dBm $\leq$ Output power < -30 dBm   | -10                  |

## 6.4.2.3 In-band emissions

The in-band emission is defined as the average emission across 12 sub-carriers and as a function of the RB offset from the edge of the allocated UL transmission bandwidth. The in-band emission is measured as the ratio of the UE output power in a non-allocated RB to the UE output power in an allocated RB.

The basic in-band emissions measurement interval is defined over one slot in the time domain; however, the minimum requirement applies when the in-band emission measurement is averaged over 10 sub-frames. When the PUSCH or PUCCH transmission slot is shortened due to multiplexing with SRS, the in-band emissions measurement interval is reduced by one or more symbols, accordingly.

The average of the basic in-band emission measurement over 10 sub-frames shall not exceed the values specified in Table 6.4.2.3-1.

Unless otherwise specified,  $\pi/2$  BPSK in this clause refers to both variants of  $\pi/2$  BPSK referenced in table 6.2.2-1.

**Table 6.4.2.3-1: Requirements for in-band emissions**

| Parameter description | Unit | Limit (NOTE 1) | Applicable Frequencies |
|-----------------------|------|----------------|------------------------|
|-----------------------|------|----------------|------------------------|

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |                                                                                                                                                                                                                                                       |                                              |                                        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|----------------------------------------|
| General                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | dB  | $\max \left\{ \begin{array}{l} -25 - 10 \cdot \log_{10} (N_{RB} / L_{CRB}), \\ 20 \cdot \log_{10} EVM - 3 - 5 \cdot ( \Delta_{RB}  - 1) / L_{CRB}, \\ -57 \text{ dBm} + 10 \log_{10} (SCS / 15 \text{ kHz}) - \overline{P_{RB}} \end{array} \right\}$ |                                              | Any non-allocated (NOTE 2)             |
| IQ Image                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | dB  | -28                                                                                                                                                                                                                                                   | Image frequencies when output power > 10 dBm | Image frequencies (NOTES 2, 3)         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     | -25                                                                                                                                                                                                                                                   | Image frequencies when output power ≤ 10 dBm |                                        |
| Carrier leakage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | dBc | -28                                                                                                                                                                                                                                                   | Output power > 10 dBm                        | Carrier leakage frequency (NOTES 4, 5) |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     | -25                                                                                                                                                                                                                                                   | 0 dBm ≤ Output power ≤ 10 dBm                |                                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     | -20                                                                                                                                                                                                                                                   | -30 dBm ≤ Output power < 0 dBm               |                                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     | -10                                                                                                                                                                                                                                                   | -40 dBm ≤ Output power < -30 dBm             |                                        |
| <p>NOTE 1: An in-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the minimum requirement is calculated as the higher of <math>\overline{P_{RB}} - 30</math> dB and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply. <math>\overline{P_{RB}}</math> is defined in NOTE 10.</p> <p>NOTE 2: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured average power per allocated RB, where the averaging is done across all allocated RBs. For pi/2 BPSK with Spectrum Shaping, the limit is expressed as a ratio of measured power in one non-allocated RB to the measured power in the allocated RB with highest PSD.</p> <p>NOTE 3: The applicable frequencies for this limit are those that are enclosed in the reflection of the allocated bandwidth, based on symmetry with respect to the carrier leakage frequency, but excluding any allocated RBs.</p> <p>NOTE 4: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured total power in all allocated RBs.</p> <p>NOTE 5: The applicable frequencies for this limit depend on the parameter <i>txDirectCurrentLocation</i> in <i>UplinkTxDirectCurrent</i> IE, and are those that are enclosed either in the RB containing the carrier leakage frequency, or in the two RBs immediately adjacent to the carrier leakage frequency but excluding any allocated RB.</p> <p>NOTE 6: <math>L_{CRB}</math> is the Transmission Bandwidth (see clause 5.3).</p> <p>NOTE 7: <math>N_{RB}</math> is the Transmission Bandwidth Configuration (see clause 5.3).</p> <p>NOTE 8: <math>EVM</math> is the limit specified in Table 6.4.2.1-1 for the modulation format used in the allocated RBs.</p> <p>NOTE 9: <math>\Delta_{RB}</math> is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g. <math>\Delta_{RB} = 1</math> or <math>\Delta_{RB} = -1</math> for the first adjacent RB outside of the allocated bandwidth).</p> <p>NOTE 10: <math>\overline{P_{RB}}</math> is an average of the transmitted power over 10 sub-frames normalized by the number of allocated RBs, measured in dBm.</p> <p>NOTE 11: For almost contiguous allocations defined in clause 6.2.2, <math>L_{CRB} = N_{RB\_alloc} + N_{RB\_gap}</math> with no in-gap emission requirement.</p> |     |                                                                                                                                                                                                                                                       |                                              |                                        |

#### 6.4.2.4 EVM equalizer spectrum flatness

The zero-forcing equalizer correction applied in the EVM measurement process (as described in Annex F) must meet a spectral flatness requirement for the EVM measurement to be valid. The EVM equalizer spectrum flatness is defined in terms of the maximum peak-to-peak ripple of the equalizer coefficients (dB) across the allocated uplink block. The basic measurement interval is the same as for EVM.

The peak-to-peak variation of the EVM equalizer coefficients contained within the frequency range of the uplink allocation shall not exceed the maximum ripple specified in Table 6.4.2.4-1 for normal conditions. For uplink allocations contained within both Range 1 and Range 2, the coefficients evaluated within each of these frequency ranges shall meet the corresponding ripple requirement and the following additional requirement: the relative difference between the maximum coefficient in Range 1 and the minimum coefficient in Range 2 must not be larger than 5 dB, and the relative difference between the maximum coefficient in Range 2 and the minimum coefficient in Range 1 must not be larger than 7 dB (see Figure 6.4.2.4-1).

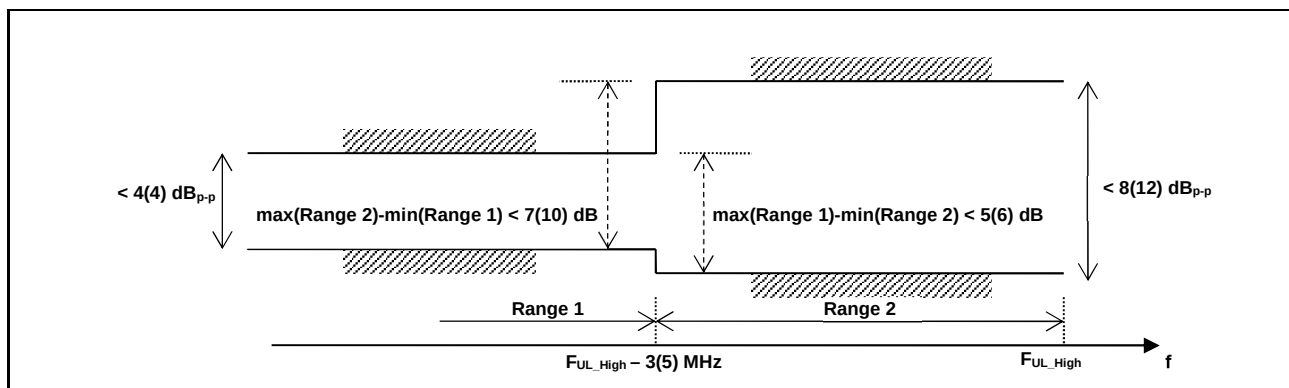
The EVM equalizer spectral flatness shall not exceed the values specified in Table 6.4.2.4-2 for extreme conditions. For uplink allocations contained within both Range 1 and Range 2, the coefficients evaluated within each of these frequency ranges shall meet the corresponding ripple requirement and the following additional requirement: the relative difference between the maximum coefficient in Range 1 and the minimum coefficient in Range 2 must not be larger than 6 dB, and the relative difference between the maximum coefficient in Range 2 and the minimum coefficient in Range 1 must not be larger than 10 dB (see Figure 6.4.2.4-1).

**Table 6.4.2.4-1: Requirements for EVM equalizer spectrum flatness (normal conditions)**

| Frequency range                                                                                                   | Maximum ripple (dB) |
|-------------------------------------------------------------------------------------------------------------------|---------------------|
| $F_{UL\_Meas} - F_{UL\_Low} \geq 3 \text{ MHz}$ and $F_{UL\_High} - F_{UL\_Meas} \geq 3 \text{ MHz}$<br>(Range 1) | 4 (p-p)             |
| $F_{UL\_Meas} - F_{UL\_Low} < 3 \text{ MHz}$ or $F_{UL\_High} - F_{UL\_Meas} < 3 \text{ MHz}$<br>(Range 2)        | 8 (p-p)             |
| NOTE 1: $F_{UL\_Meas}$ refers to the sub-carrier frequency for which the equalizer coefficient is evaluated       |                     |
| NOTE 2: $F_{UL\_Low}$ and $F_{UL\_High}$ refer to each NR frequency band specified in Table 5.2-1                 |                     |

**Table 6.4.2.4-2: Minimum requirements for EVM equalizer spectrum flatness (extreme conditions)**

| Frequency range                                                                                                   | Maximum Ripple (dB) |
|-------------------------------------------------------------------------------------------------------------------|---------------------|
| $F_{UL\_Meas} - F_{UL\_Low} \geq 5 \text{ MHz}$ and $F_{UL\_High} - F_{UL\_Meas} \geq 5 \text{ MHz}$<br>(Range 1) | 4 (p-p)             |
| $F_{UL\_Meas} - F_{UL\_Low} < 5 \text{ MHz}$ or $F_{UL\_High} - F_{UL\_Meas} < 5 \text{ MHz}$<br>(Range 2)        | 12 (p-p)            |
| NOTE 1: $F_{UL\_Meas}$ refers to the sub-carrier frequency for which the equalizer coefficient is evaluated       |                     |
| NOTE 2: $F_{UL\_Low}$ and $F_{UL\_High}$ refer to each NR frequency band specified in Table 5.2-1                 |                     |

**Figure 6.4.2.4-1: The limits for EVM equalizer spectral flatness with the maximum allowed variation of the coefficients indicated (the ETC minimum requirement are within brackets).**

#### 6.4.2.4.1 Requirements for Pi/2 BPSK modulation

These requirements apply if the IE *powerBoostPi2BPSK* is set to 1 for power class 3 UE operating in TDD bands n40, n41, n77, n78 and n79 with Pi/2 BPSK modulation and UE indicates support for UE capability *powerBoosting-pi2BPSK* and 40 % or less slots in radio frame are used for UL transmission. These requirements also apply if the IE *dmrs-UplinkTransformPrecoding-r16* is configured and UE indicates support for UE capability *lowPAPR-DMRS-PUSCHwithPrecoding-r16*. Otherwise the requirements for EVM equalizer spectrum flatness defined in clause 6.4.2.4 apply

The EVM equalizer coefficients across the allocated uplink block shall be modified to fit inside the mask specified in Table 6.4.2.4.1-1 for normal conditions, prior to the calculation of EVM. The limiting mask shall be placed to minimize the change in equalizer coefficients in a sum of squares sense.

**Table 6.4.2.4.1-1: Mask for EVM equalizer coefficients for Pi/2 BPSK, normal conditions**

| Frequency range                                                                                             | Parameter | Maximum ripple (dB) |
|-------------------------------------------------------------------------------------------------------------|-----------|---------------------|
| $ F_{UL\_Meas} - F_{center}  \leq X \text{ MHz}$<br>(Range 1)                                               | X1        | 6 (p-p)             |
| $ F_{UL\_Meas} - F_{center}  > X \text{ MHz}$<br>(Range 2)                                                  | X2        | 14 (p-p)            |
| NOTE 1: $F_{UL\_Meas}$ refers to the sub-carrier frequency for which the equalizer coefficient is evaluated |           |                     |
| NOTE 2: $F_{center}$ refers to the center frequency of an allocated block of PRBs                           |           |                     |

NOTE 3: X, in MHz, is equal to 25% of the bandwidth of the PRB allocation  
 NOTE 4: See Figure 6.4.2.4.1-1 for description of X1, X2

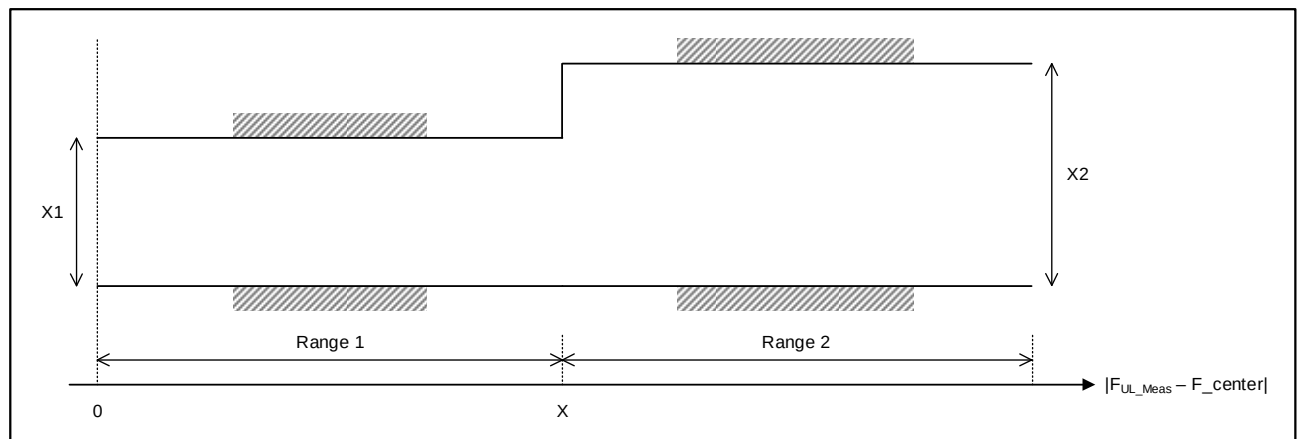


Figure 6.4.2.4.1-1: The limits for EVM equalizer spectral flatness with the maximum allowed variation.

For Pi/2 BPSK modulation the UE shall be allowed to employ spectral shaping and the shaping filter shall be restricted so that the impulse response of the shaping filter itself shall meet

$$\begin{aligned} |\tilde{a}_t(t,0)| &\geq |\tilde{a}_t(t,\tau)| \quad \forall \tau \neq 0 \\ 20\log_{10} |\tilde{a}_t(t,\tau)| &< -15 \text{ dB} \quad 1 < \tau < M - 1, \end{aligned}$$

where  $|\tilde{a}_t(t,\tau)| = \text{IDFT}\{|\tilde{a}_t(t,f)| e^{j\varphi(t,f)}\}$ ,  $f$  is the frequency of the  $M$  allocated subcarriers,  $\tilde{a}_t(t,f)$  and  $\varphi(t,f)$  are the amplitude and phase response.

0 dB reference is defined as  $20\log_{10} |\tilde{a}_t(t,0)|$ .

### 6.4.2.5 Phase continuity requirements for DMRS bundling

For bands that UE indicates the support of DMRS bundling, when the UE is configured with DMRS bundling, the maximum allowable difference between the measured phase value in any slot  $p-1$  and slot  $p$ , or slot 0 and any slot  $p$  for each antenna connector shall satisfy the requirements as listed in Table 6.4.2.5-1 for the measurement conditions defined in Table 6.4.2.5-2, within a measurement time window limited by the UE capability of maximum duration for DMRS bundling [*maxDurationDMRS-Bundling-r17*], and defined for each frequency band separately. The phase value for each slot is measured as shown in Annex F.9. These requirements apply to PUCCH and PUSCH transmissions with DFT-s-OFDM and CP-OFDM waveforms.

Unless otherwise specified, pi/2 BPSK in this clause refers to both variants of pi/2 BPSK referenced in table 6.2.2-1.

Table 6.4.2.5-1: Maximum allowable phase difference for DMRS bundling

| UL channel                                                                                                                                                                                                                                         | Modulation order      | Phase difference between any slot $p-1$ and slot $p$ (NOTE 2) | Phase difference between slot 0 and any slot $p$ (NOTE 3) |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------------------------------------------------------|-----------------------------------------------------------|
| PUSCH                                                                                                                                                                                                                                              | Pi/2 BPSK, QPSK       | [25] degrees                                                  | [30] degrees                                              |
| PUCCH                                                                                                                                                                                                                                              | Pi/2 BPSK, BPSK, QPSK |                                                               |                                                           |
| NOTE 1: The UE capability of the length of maximum duration refers to the maximum time duration during which UE is able to meet the phase continuity requirements, assuming no phase consistency violating events defined in TS 38.214 in between. |                       |                                                               |                                                           |
| NOTE 2: This requirement applies for FDD and TDD bands, for supported DMRS bundling configurations $\leq 8$ slots.                                                                                                                                 |                       |                                                               |                                                           |
| NOTE 3: This requirement applies only for FDD bands, for supported DMRS bundling configurations of 16 slots.                                                                                                                                       |                       |                                                               |                                                           |

The above requirements are applicable when all the following conditions are met within the measurement time window:

- RB allocation in terms of length and frequency position does not change, and intra-slot and inter-slot frequency hopping is not activated.
- Modulation order does not change.
- No network commanded TA takes effect.
- The TPMI precoder does not change.
- There is no change in UE transmission power level, and no change in the level of P-MPR applied by the UE.
- UE is not scheduled with uplink transmission of other physical channel/signal in-between the PUSCH or PUCCH transmissions.
- For TDD, no downlink slot(s) or downlink symbol(s) or flexible symbol(s) with/without DL monitoring occasion configured in-between the PUSCH or PUCCH transmissions.

**Table 6.4.2.5-2: Measurement conditions for the maximum allowable phase difference**

| Parameter                  | Unit | Level                                                                            |
|----------------------------|------|----------------------------------------------------------------------------------|
| UE Output Power            | dBm  | $P_{\text{CMAX},f,c}$ in clause 6.2.4, P-MPR = 0                                 |
| UE downlink received power |      | Not change                                                                       |
| Operating conditions       |      | Normal conditions                                                                |
| Transmission bandwidth     |      | Confined within $F_{\text{UL,low}} + [4]$ MHz and $F_{\text{UL,high}} - [4]$ MHz |
| DL signal frequency        |      | Not change before and during the measurement window                              |
| DL signal timing           |      | Maintained constant before and during the measurement window                     |
| UL slots for testing       |      | Tested on consecutive UL slots                                                   |
| PUSCH waveform for testing |      | DFT-s-OFDM                                                                       |

## 6.4A Transmit signal quality for CA

### 6.4A.1 Frequency error for CA

#### 6.4A.1.1 Frequency error for intra-band contiguous CA

For intra-band contiguous carrier aggregation the UE modulated carrier frequencies per band shall be accurate to within  $\pm 0.1$  PPM observed over a period of 1 ms of cumulated measurement intervals compared to the carrier frequency of primary component carrier received in the corresponding band

#### 6.4A.1.2 Frequency error for intra-band non-contiguous CA

For intra-band non-contiguous carrier aggregation the requirements in Section 6.4.1 applies per component carrier.

#### 6.4A.1.3 Frequency error for inter-band CA

For inter-band carrier aggregation with one uplink carrier assigned to one NR band, the frequency error requirements in subclause 6.4.1 apply.

For inter-band carrier aggregation with two uplink non-contiguous carrier assigned to one NR band, the frequency error requirements in subclause 6.4A.1.2 apply for those carriers.

For inter-band carrier aggregation with uplink assigned to two NR bands, the frequency error requirements defined in clause 6.4.1 shall apply on each component carrier with all component carriers active.

For combinations of intra-band and inter-band carrier aggregation with three uplink component carriers (up to two contiguously aggregated carriers per operating band), the frequency error requirements specified in subclause 6.4.1 apply for the NR band supporting one component carrier, and for the NR band supporting two contiguous component carriers the requirements specified in subclause 6.4A.1.1 apply.

#### 6.4A.1.4 Void

### 6.4A.2 Transmit modulation quality for CA

#### 6.4A.2.1 Transmit modulation quality for intra-band contiguous CA

##### 6.4A.2.1.0 General

For intra-band contiguous carrier aggregation, the requirements in clauses 6.4A.2.1.1, 6.4A.2.1.2 and 6.4A.2.1.3 applies.

The requirements in this clause apply with PCC and SCC in the UL configured and activated: PCC with PRB allocation and SCC without PRB allocation and without CSI reporting and SRS configured.

The Carrier leakage frequency is optionally indicated by the UE via IE *UplinkTxDirectCurrentList*, IE *UplinkTxDirectCurrentTwoCarrierList-r16* for CA with two component carriers configured for uplink or IE *UplinkTxDirectCurrentMoreCarrierList-r17* for CA of any configuration.

If the UE does not indicate DC location parameters, the carrier leakage measurement requirement in clauses 6.4A.2.2 and 6.4A.2.3 shall be waived and the UE's UL signal left uncorrected for carrier leakage. Any requirement relaxation to accommodate the IQ image shall be omitted.

If the UE indicates carrier leakage frequency as 3300 or 3301 with IE *UplinkTxDirectCurrentList* or *UplinkTxDirectCurrentTwoCarrierList-r16*, or if the carrier leakage frequency is outside the activated UL component carriers, the carrier leakage measurement requirement in clauses 6.4A.2.2 and 6.4A.2.3 shall be waived and the UE's UL signal left uncorrected for carrier leakage. Any requirement relaxation to accommodate the IQ image shall be omitted.

##### 6.4A.2.1.1 Error Vector Magnitude

For the intra-band contiguous carrier aggregation, the Error Vector Magnitude requirement should be defined for each component carrier. Requirements only apply with PRB allocation in one of the component carriers. Similar transmitter impairment removal procedures are applied for CA waveform before EVM calculation as is specified for non-CA waveform in sub-clause 6.4.2.1.

When a single component carrier is configured Table 6.4.2.1-1 apply.

The EVM requirements are according to Table 6.4A.2.1.1-1 if CA is configured in uplink with the parameters defined in Table 6.4.2.1-2.

Unless otherwise specified,  $\pi/2$  BPSK in this clause refers to both variants of  $\pi/2$  BPSK referenced in table 6.2.2-1.

**Table 6.4A.2.1.1-1: Minimum requirements for Error Vector Magnitude**

| Parameter | Unit | Average EVM Level per CC |
|-----------|------|--------------------------|
| Pi/2-BPSK | %    | 30                       |
| QPSK      | %    | 17.5                     |
| 16 QAM    | %    | 12.5                     |
| 64 QAM    | %    | 8                        |
| 256 QAM   | %    | 3.5                      |

### 6.4A.2.1.2 In-band emissions

For intra-band contiguous carrier aggregation, the requirements in Table 6.4A.2.1.2-1 and 6.4A.2.1.2-2 apply within the aggregated transmission bandwidth configuration with both component carrier (s) active and one single contiguous PRB allocation of bandwidth  $L_{CRE}$  at the edge of the aggregated transmission bandwidth configuration.

The inband emission is defined as the interference falling into the non allocated resource blocks for all component carriers. The measurement method for the inband emissions in the component carrier with PRB allocation is specified in annex F.3. For a non allocated component carrier a spectral measurement is specified.

**Table 6.4A.2.1.2-1: Minimum requirements for in-band emissions (allocated component carrier)**

| Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                              | Unit | Limit                                                                                                                                                                                                                                 |                                                               | Applicable Frequencies               |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|--------------------------------------|
| General                                                                                                                                                                                                                                                                                                                                                                                                                                                | dB   | $\max \left\{ -25 - 10 \cdot \log_{10} (N_{RB} / L_{CRB}), \right.$ $20 \cdot \log_{10} EVM - 3 - 5 \cdot ( \Delta_{RB}  - 1) / L_{CRB},$ $\left. -57 \text{ dBm} + 10 \log_{10} (SCS / 15 \text{ kHz}) - \overline{P_{RB}} \right\}$ |                                                               | Any non-allocated (NOTE 2)           |
| IQ Image                                                                                                                                                                                                                                                                                                                                                                                                                                               | dB   | -28                                                                                                                                                                                                                                   | Output power > 10 dBm                                         | Image frequencies (NOTE 3)           |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                        |      | -25                                                                                                                                                                                                                                   | $0 \leq \text{Output power} \leq 10 \text{ dBm}$              |                                      |
| Carrier leakage                                                                                                                                                                                                                                                                                                                                                                                                                                        | dBc  | -28                                                                                                                                                                                                                                   | Output power > 10 dBm                                         | Carrier leakage frequency (NOTE 4,5) |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                        |      | -25                                                                                                                                                                                                                                   | $0 \text{ dBm} \leq \text{Output power} \leq 10 \text{ dBm}$  |                                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                        |      | -20                                                                                                                                                                                                                                   | $-30 \text{ dBm} \leq \text{Output power} \leq 0 \text{ dBm}$ |                                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                        |      | -10                                                                                                                                                                                                                                   | $-40 \text{ dBm} \leq \text{Output power} < -30 \text{ dBm}$  |                                      |
| NOTE 1: An in-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the minimum requirement is calculated as the higher of $\overline{P_{RB}} - 30 \text{ dB}$ and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply. $\overline{P_{RB}}$ is defined in NOTE 10. The limit is evaluated in each non-allocated RB.                                                                   |      |                                                                                                                                                                                                                                       |                                                               |                                      |
| NOTE 2: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured average power per allocated RB, where the averaging is done across all allocated RBs                                                                                                                                                                                                                         |      |                                                                                                                                                                                                                                       |                                                               |                                      |
| NOTE 3: The applicable frequencies for this limit are those that are enclosed in the reflection of the allocated bandwidth, based on symmetry with respect to the carrier leakage frequency, but excluding any allocated RBs.                                                                                                                                                                                                                          |      |                                                                                                                                                                                                                                       |                                                               |                                      |
| NOTE 4: Exceptions to the general limit are allowed for up to two contiguous non-allocated RBs. The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in the non-allocated RB to the measured total power in all allocated RBs.                                                                                                                                                                                    |      |                                                                                                                                                                                                                                       |                                                               |                                      |
| NOTE 5: The applicable frequencies for this limit are those that are enclosed either in the RB containing the carrier leakage frequency, or in the two RBs immediately adjacent to the carrier leakage frequency but excluding any allocated RB. Carrier leakage frequency is indicated by the UE as described in clause 6.4A.2.1.0. When only one uplink carrier is activated, the applicable LO leakage frequency follow definition in clause 6.4.2. |      |                                                                                                                                                                                                                                       |                                                               |                                      |
| NOTE 6: $L_{CRE}$ is the Transmission Bandwidth (see clause 5.3) not exceeding $\lfloor N_{RB}/2-1 \rfloor$ .                                                                                                                                                                                                                                                                                                                                          |      |                                                                                                                                                                                                                                       |                                                               |                                      |
| NOTE 7: $N_{RB}$ is the Transmission Bandwidth Configuration (see clause 5.3) of the component carrier with RBs allocated.                                                                                                                                                                                                                                                                                                                             |      |                                                                                                                                                                                                                                       |                                                               |                                      |
| NOTE 8: $EVM$ is the limit specified in Table 6.4.2.1-1 for the modulation format used in the allocated RBs.                                                                                                                                                                                                                                                                                                                                           |      |                                                                                                                                                                                                                                       |                                                               |                                      |
| NOTE 9: $\Delta_{RB}$ is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g. $\Delta_{RB}=1$ or $\Delta_{RB}=-1$ for the first adjacent RB outside of the allocated bandwidth).                                                                                                                                                                                                                             |      |                                                                                                                                                                                                                                       |                                                               |                                      |
| NOTE 10: $\overline{P_{RB}}$ is an average of the transmitted power over 10 sub-frames normalized by the number of allocated RBs, measured in dBm.                                                                                                                                                                                                                                                                                                     |      |                                                                                                                                                                                                                                       |                                                               |                                      |

**Table 6.4A.2.1.2-2: Minimum requirements for in-band emissions (not allocated component carrier)**

| Parameter | Unit | Meas BW<br>NOTE 1 | Limit | remark | Applicable<br>Frequencies |
|-----------|------|-------------------|-------|--------|---------------------------|
|-----------|------|-------------------|-------|--------|---------------------------|



|                                                                                                                                                                                                                                 |     |            |                                                                                                                                                                                                         |                                  |                                                                                                |                                                                                                                                                                                                                        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| General                                                                                                                                                                                                                         | dB  | BW of 1 RB | $\max\left\{-25-10\cdot\log_{10}(N_{RB}/L_{CRB}),\right.$<br>$20\cdot\log_{10}EVM-3-5\cdot( \Delta_{RB} -1)/L_{CRB},$<br>$\left.-57\text{ dBm}+10\log_{10}(SCS/15\text{kHz})-\overline{P_{RB}}\right\}$ |                                  | The reference value is the average power per allocated RB in the allocated component carrier   | Any RB in the non allocated component carrier. The frequency raster of the RBs is derived when this component carrier is allocated with RBs                                                                            |
| IQ Image                                                                                                                                                                                                                        | dB  | BW of 1 RB | NOTE 2                                                                                                                                                                                                  |                                  | The reference value is the average power per allocated RB in the allocated component carrier   | Image frequencies (NOTES 6,7) If UE does not indicate exact frequency for carrier leakage, this requirement does not apply.                                                                                            |
|                                                                                                                                                                                                                                 |     |            | -28                                                                                                                                                                                                     | Output power > 10 dBm            |                                                                                                |                                                                                                                                                                                                                        |
|                                                                                                                                                                                                                                 |     |            | -25                                                                                                                                                                                                     | 0≤ Output power ≤ 10 dBm         |                                                                                                |                                                                                                                                                                                                                        |
| Carrier leakage                                                                                                                                                                                                                 | dBc | BW of 1 RB | NOTE 3                                                                                                                                                                                                  |                                  | The reference value is the total power of the allocated RBs in the allocated component carrier | The frequencies of the up to 2 non-allocated RBs are indicated with IE <i>UplinkTxDirectCurrentMoreCarrierList-r17</i> . If UE does not indicate exact frequency for carrier leakage, this requirement does not apply. |
|                                                                                                                                                                                                                                 |     |            | -28                                                                                                                                                                                                     | Output power > 10 dBm            |                                                                                                |                                                                                                                                                                                                                        |
|                                                                                                                                                                                                                                 |     |            | -25                                                                                                                                                                                                     | 0 dBm ≤ Output power ≤ 10 dBm    |                                                                                                |                                                                                                                                                                                                                        |
|                                                                                                                                                                                                                                 |     |            | -20                                                                                                                                                                                                     | -30 dBm ≤ Output power ≤ 0 dBm   |                                                                                                |                                                                                                                                                                                                                        |
|                                                                                                                                                                                                                                 |     |            | -10                                                                                                                                                                                                     | -40 dBm ≤ Output power < -30 dBm |                                                                                                |                                                                                                                                                                                                                        |
| NOTE1: Resolution BWs smaller than the measurement BW may be integrated to achieve the measurement bandwidth.                                                                                                                   |     |            |                                                                                                                                                                                                         |                                  |                                                                                                |                                                                                                                                                                                                                        |
| NOTE 2: Exceptions to the general limit is are allowed for up to $L_{CRE}+1$ RBs within a contiguous width of $L_{CRE}+1$ non-allocated RBs.                                                                                    |     |            |                                                                                                                                                                                                         |                                  |                                                                                                |                                                                                                                                                                                                                        |
| NOTE 3: Two Exceptions to the general limit are allowed for up to two contiguous non-allocated RBs                                                                                                                              |     |            |                                                                                                                                                                                                         |                                  |                                                                                                |                                                                                                                                                                                                                        |
| NOTE 4: NOTES 1, 5, 6, 7, 8, 9 from Table 6.4A.2.1.1-1 apply for Table 6.4A.2.1.2-2 as well.                                                                                                                                    |     |            |                                                                                                                                                                                                         |                                  |                                                                                                |                                                                                                                                                                                                                        |
| NOTE 5: $\Delta_{RB}$ for measured non-allocated RB in the non allocated component carrier may take non-integer values when the carrier spacing between the CCs is not a multiple of RB.                                        |     |            |                                                                                                                                                                                                         |                                  |                                                                                                |                                                                                                                                                                                                                        |
| NOTE 6: The applicable frequencies for this limit are those that are enclosed in the reflection of the allocated bandwidth, based on symmetry with respect to the carrier leakage frequency, but excluding any allocated RBs    |     |            |                                                                                                                                                                                                         |                                  |                                                                                                |                                                                                                                                                                                                                        |
| NOTE 7: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured average power per allocated RB, where the averaging is done across all allocated RBs. |     |            |                                                                                                                                                                                                         |                                  |                                                                                                |                                                                                                                                                                                                                        |

### 6.4A.2.1.3 Carrier leakage

Carrier leakage is an additive sinusoid waveform that is confined within the aggregated transmission bandwidth configuration. When only one uplink carrier is activated, the applicable carrier leakage requirement follows definition in clause 6.4.2. The measurement interval is one slot in the time domain.

The relative carrier leakage power is a power ratio of the additive sinusoid waveform and the modulated waveform. For intra-band contiguous CA, the relative carrier leakage power shall not exceed the values specified in Table 6.4A.2.1.3-1. The requirement does not apply if the indicated location of carrier leakage is outside the activated UL carriers.

**Table 6.4A.2.1.3-1: Minimum requirements for Relative Carrier Leakage Power**

| Parameters                       | Relative Limit (dBc) |
|----------------------------------|----------------------|
| Output power > 10 dBm            | -28                  |
| 0 dBm ≤ Output power ≤ 10 dBm    | -25                  |
| -30 dBm ≤ Output power < 0 dBm   | -20                  |
| -40 dBm ≤ Output power < -30 dBm | -10                  |

## 6.4A.2.2 Transmit modulation quality for intra-band non-contiguous CA

### 6.4A.2.2.0 General

For intra-band non-contiguous carrier aggregation, the requirements in subclauses 6.4A.2.2.1, 6.4A.2.2.2 applies.

The requirements in this clause apply with PCC and SCC in the UL configured and activated: PCC with PRB allocation and SCC without PRB allocation and without CSI reporting and SRS configured.

Carrier leakage frequency is indicated by the UE with IE UplinkTxDirectCurrentMoreCarrierList-r17 or UplinkTxDirectCurrentTwoCarrierList-r16 or UplinkTxDirectCurrentList.

The carrier leakage measurement requirement in clause 6.4A.2.2.2 shall be waived and the UE's UL signal left uncorrected for carrier leakage when one of the following qualifying conditions apply:

1. UE reports the parameter 3300 or 3301
2. UE doesn't indicate the DC location parameters

Any requirement relaxation to accommodate the IQ image shall be omitted if the qualifying conditions above are present or if the IQ image frequency is outside the activated UL component carriers.

### 6.4A.2.2.1 Error Vector Magnitude

For the intra-band non-contiguous carrier aggregation, the Error Vector Magnitude requirement should be defined for each component carrier. Requirements only apply with PRB allocation in one of the component carriers. Similar transmitter impairment removal procedures are applied for CA waveform before EVM calculation as is specified for non-CA waveform in sub-section 6.4.2.1.

When a single component carrier is configured Table 6.4.2.1-1 apply.

The EVM requirements are according to Table 6.4A.2.2.1-1 if CA is configured in uplink with the parameters defined in Table 6.4.2.1-2.

Unless otherwise specified,  $\pi/2$  BPSK in this clause refers to both variants of  $\pi/2$  BPSK referenced in table 6.2.2-1.

**Table 6.4A.2.2.1-1: Minimum requirements for Error Vector Magnitude**

| Parameter | Unit | Average EVM Level per CC |
|-----------|------|--------------------------|
| Pi/2-BPSK | %    | 30                       |
| QPSK      | %    | 17.5                     |
| 16 QAM    | %    | 12.5                     |
| 64 QAM    | %    | 8                        |
| 256 QAM   | %    | 3.5                      |

#### 6.4A.2.2.2 In-band emissions

For intra-band non-contiguous carrier aggregation the requirements for in-band emissions are defined for each component carrier. Requirements defined in clause 6.4A.2.1.2 only apply with PRB allocation in one of the component carriers.

When signalling for dualPA-Architecture IE is absent, carrier leakage or I/Q image may land inside the gap spectrum between 2 UL CCs.

For intra-band non-contiguous CA, the IQ image requirement is defined with the applicable frequencies based on symmetry with respect to the carrier leakage frequency, but excluding any allocated RBs.

#### 6.4A.2.2.3 Carrier leakage

The relative carrier leakage power is a power ratio of the additive sinusoid waveform and the modulated waveform. For intra-band non-contiguous CA, the relative carrier leakage power shall not exceed the values specified in Table 6.4A.2.1.3-1. The requirement does not apply if the indicated location of carrier leakage is outside the activated UL carriers.

#### 6.4A.2.3 Transmit modulation quality for inter-band CA

For inter-band carrier aggregation with one uplink carrier assigned to one NR band, the transmit modulation quality requirements in subclause 6.4.2 apply.

For inter-band downlink carrier aggregation with a single uplink carrier assigned to one NR band, DMRS bundling requirements in subclause 6.4.2.5 apply to the uplink carrier when the UE indicates support of [*maxDurationDMRS-Bundling-r17*] for the NR band and is configured for DMRS bundling in the uplink carrier.

For inter-band carrier aggregation with two contiguous carriers assigned to one NR band, the transmit modulation quality requirements in subclause 6.4A.2.1 apply for those carriers.

For inter-band carrier aggregation with two uplink non-contiguous carrier assigned to one NR band, the transmit modulation quality requirements in subclause 6.4A.2.2 apply for those carriers.

For inter-band carrier aggregation with uplink assigned to two NR bands, the transmit modulation quality requirements shall apply on each component carrier as defined in clause 6.4.2 with all component carriers active: PCC with PRB allocation and SCC without PRB allocation and without CSI reporting and SRS configured. For DMRS bundling [*maxDurationDMRS-Bundling-r17*], requirements for phase continuity in clause 6.4.2.5 apply when all of the following additional conditions are met:

- During DMRS bundling time window, concurrent transmissions scheduled/configured over multiple carriers [including any channels and/or signals] are not expected by UE
- Only one band is configured with DMRS bundling at a time
- All carriers are on same TAG

When the capability *uplinkTxSwitchingPeriod* is present, the UE indicates support of [*dmrs-BundlingPUCCH-RepPerBC-r17*], and the UE is configured for uplink switching mechanisms specified in clause 6.1.6 of TS 38.214 [10], the phase continuity requirement in clause 6.4.2.5 for DMRS bundling is applicable under the following conditions:

- During the DMRS bundling time window, concurrent transmissions scheduled/configured over multiple carriers, including any channels and/or signals, are not expected by UE
- Only one carrier is configured with DMRS bundling at a time
- All carriers are on the same TAG
- DMRS bundling is not maintained across Tx switching period in the UL carrier configured with DMRS bundling

For combinations of intra-band and inter-band carrier aggregation with three uplink component carriers (up to two contiguously aggregated carriers per operating band): for the NR band supporting one component carrier the transmit modulation quality requirements specified in subclauses from 6.4.2.1 to 6.4.2.4 apply and for DMRS bundling [*maxDurationDMRS-Bundling-r17*] the DMRS bundling requirements for inter-band carrier aggregation with uplink assigned to two NR bands apply. For the NR band supporting two contiguous component carriers the requirements specified in subclause 6.4A.2.1 apply.

#### 6.4A.2.4 Void

### 6.4B Transmit signal quality for NR-DC

For inter-band NR-DC with one uplink carrier assigned per NR band, the transmit signal quality for the corresponding inter-band CA configuration as specified in clause 6.4A applies with the exception of DMRS bundling [*maxDurationDMRS-Bundling-r17*] requirements.

### 6.4C Transmit signal quality for SUL

For the UE which is configured with both NR UL and NR SUL carriers in a serving cell with active transmission either on the UL carrier(s) or SUL carrier, the transmit signal quality requirements specified in clause 6.4.2 and 6.4A.2 are applicable for the UL carrier(s) and the SUL carrier, respectively.

If the UE indicates that it is capable of DMRS bundling *maxDurationDMRS-Bundling-r17* on the NR SUL band and UE is configured for DMRS bundling on SUL carrier or the UE indicates that it is capable of DMRS bundling *maxDurationDMRS-Bundling-r17* on the NR UL band and UE is configured for DMRS bundling on NR UL carrier, the requirements for phase continuity in clause 6.4.2.5 apply for the corresponding SUL carrier or NR UL carrier, respectively. Only one band can be configured with DMRS bundling at a time.

### 6.4D Transmit signal quality for UL MIMO

#### 6.4D.0 General

For a UE supporting UL MIMO, the requirements in this section are defined per layer or as the sum of emissions from both antennas to account for the UL MIMO scheme.

Alternatively, when applicable, requirements may be verified per antenna connector using an UL MIMO transmission

with codebook of  $\frac{1}{\sqrt{2}} \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$  and a configuration defined in Table 6.4D.0-1.

**Table 6.4D.0-1: UL MIMO configuration for per connector measurements**

| Transmission scheme   | DCI format     | Codebook Index   |
|-----------------------|----------------|------------------|
| Codebook based uplink | DCI format 0_1 | Codebook index 0 |

## 6.4D.1 Frequency error for UL MIMO

For UE(s) supporting UL MIMO, the basic measurement interval of modulated carrier frequency is 1 UL slot. The mean value of basic measurements of UE modulated carrier frequency per layer shall be accurate to within  $\pm 0.1$  PPM observed over a period of 1 ms of cumulated measurement intervals compared to the carrier frequency received from the NR Node B.

## 6.4D.2 Transmit modulation quality for UL MIMO

### 6.4D.2.0 General

For UE supporting UL MIMO, the transmit modulation quality requirements are specified based on measurements made at each transmit antenna connector.

If UE is scheduled for single antenna-port PUSCH transmission by DCI format 0\_0 or by DCI format 0\_1 for single antenna port codebook based transmission with precoding matrix  $W=1$  [6.3.1.5 TS 38.211], the requirements in clause 6.4.2 apply when  $TxD$  is not indicated, and the requirements in clause 6.4G.2 apply when  $TxD$  is indicated.

The transmit modulation quality is specified in terms of:

- Error Vector Magnitude (EVM) for the allocated resource blocks (RBs)
- EVM equalizer spectrum flatness derived from the equalizer coefficients generated by the EVM measurement process
- Carrier leakage (caused by IQ offset)
- In-band emissions for the non-allocated RB

In case the parameter 3300 or 3301 is reported from UE via the parameter *txDirectCurrentLocation* in *UplinkTxDirectCurrentList* IE (as defined in TS 38.331 [7]), carrier leakage measurement requirement in clause 6.4D.2.2 and 6.4D.2.3 shall be waived, and the RF correction with regard to the carrier leakage and IQ image shall be omitted during the calculation of transmit modulation quality.

### 6.4D.2.1 Error Vector Magnitude

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the Error Vector Magnitude requirements specified in clause 6.4.2.1 apply per layer. The requirements shall be met with the UL MIMO configurations specified in Table 6.2D.1-2.

### 6.4D.2.2 Carrier leakage

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the Relative Carrier Leakage Power requirements specified in Table 6.4.2.2-1 which is defined in clause 6.4.2.2 apply per layer. The requirements shall be met with the UL MIMO configurations specified in Table 6.2D.1-2.

### 6.4D.2.3 In-band emissions

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the In-band Emission requirements specified in Table 6.4.2.3-1 which is defined in clause 6.4.2.3 apply at each transmit antenna connector. The requirements shall be met with the uplink MIMO configurations specified in Table 6.2D.1-2

### 6.4D.2.4 EVM equalizer spectrum flatness for UL MIMO

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the EVM Equalizer Spectrum Flatness requirements specified in clause 6.4.2.4 apply per layer. The requirements shall be met with the UL MIMO configurations specified in Table 6.2D.1-2

### 6.4D.3 Time alignment error for UL MIMO

For UE(s) with multiple transmit antenna connectors supporting UL MIMO, this requirement applies to frame timing differences between transmissions on multiple transmit antenna connectors in the closed-loop spatial multiplexing scheme.

The time alignment error (TAE) is defined as the average frame timing difference between any two transmissions on different transmit antenna connectors.

For UE(s) with multiple transmit antenna connectors, the Time Alignment Error (TAE) shall not exceed 130 ns.

### 6.4D.4 Requirements for coherent UL MIMO

For coherent UL MIMO, Table 6.4D.4-1 lists the maximum allowable difference between the measured relative power and phase errors between different antenna connectors in any slot within the specified time window from the last transmitted SRS on the same antenna connectors, for the purpose of uplink transmission (codebook or non-codebook usage) and those measured at that last SRS. The requirements in Table 6.4D.4-1 apply when the UL transmission power at each antenna connector is larger than 0 dBm for SRS transmission and for the duration of time window.

**Table 6.4D.4-1: Maximum allowable difference of relative phase and power errors in a given slot compared to those measured at last SRS transmitted**

| Difference of relative phase error | Difference of relative power error | Time window |
|------------------------------------|------------------------------------|-------------|
| 40 degrees                         | 4 dB                               | 20 msec     |

The above requirements when all the following conditions are met within the specified time window:

- UE is not signaled with a change in number of SRS ports in SRS-config, or a change in PUSCH-config
- UE remains in DRX active time (UE does not enter DRX OFF time)
- No measurement gap occurs
- No instance of SRS transmission with the usage antenna switching occurs
- Active BWP remains the same
- EN-DC and CA configuration is not changed for the UE (UE is not configured or de-configured with PSCell or SCell(s))
- When UE is not configured with uplink switching; or when UE is configured with uplink switching, and ‘fullCoherent’ codebook subset is supported in the corresponding carrier according to the capability *uplinkTxSwitching-PUSCH-TransCoherence* and/or *uplinkTxSwitching2T2T-PUSCH-TransCoherence*; or when UE is configured with uplink switching, ‘nonCoherent’ codebook subset is supported in the corresponding carrier according to the capability *uplinkTxSwitching-PUSCH-TransCoherence* and/or *uplinkTxSwitching2T2T-PUSCH-TransCoherence*, and uplink switching is not triggered by the switching mechanisms specified in sub-clause 6.1.6 of TS 38.214 [10] between last transmitted SRS and scheduled transmission.

## 6.4E Transmit signal quality for V2X

### 6.4E.1 Frequency error for V2X

#### 6.4E.1.1 General

The UE modulated carrier frequency for NR V2X sidelink transmissions in Table 5.2E.1-1, shall be accurate to within  $\pm 0.1$  PPM observed over a period of 1 ms compared to the absolute frequency in case of using GNSS synchronization source. The same requirements applied over a period of 1 ms compared to the carrier frequency received from the gNB or V2X synchronization reference UE in case of using the gNB or V2X synchronization reference UE sidelink synchronization signals.

For NR V2X UE supporting SL MIMO or Tx Diversity, the UE modulated carrier frequency at each transmit antenna connector shall be accurate to within  $\pm 0.1$  PPM observed over a period of 1 ms in case of using GNSS synchronization source. The same requirements apply over a period of 1 ms compared to the relative frequency in case of using the NR gNode B or V2X synchronization reference UE sidelink synchronization signals.

If the UE transmits on one antenna connector at a time, the requirements for single carrier shall apply to the active antenna connector.

#### 6.4E.1.2 Frequency error for V2X concurrent operation

For the inter-band concurrent NR V2X operation, the requirements specified in clause 6.4.1 shall apply for the uplink in licensed band and the requirements specified in clause 6.4E.1.1 shall apply for the sidelink in licensed band or Band n47.

For the intra-band concurrent NR V2X operation, the requirements specified in clause 6.4.1 shall apply for the uplink in licensed band and the requirements specified in clause 6.4E.1 shall apply for the sidelink in licensed band.

### 6.4E.2 Transmit modulation quality for V2X

#### 6.4E.2.1 General

The transmit modulation quality requirements in this clause apply to V2X sidelink transmissions.

For NR V2X UE supporting SL MIMO or Tx Diversity, the transmit modulation quality requirements for single carrier shall apply to each transmit antenna connector.

If V2X UE transmits on one antenna connector at a time, the requirements specified for single carrier apply to the active antenna connector.

#### 6.4E.2.2 Error Vector Magnitude for V2X

For V2X sidelink physical channels PSCCH and PSSCH, the Error Vector Magnitude requirements shall be as specified for PUSCH in Table 6.4.2.1-1 except  $\pi/2$ -BPSK for NR V2X operating bands in Table 5.2E.1-1. When sidelink transmissions are shortened due to transmission gap of one symbol at the end of the slot, the EVM measurement interval is reduced by one symbol, accordingly.

#### 6.4E.2.3 Carrier leakage for V2X

Carrier leakage of NR V2X sidelink transmission, the requirements for NR PUSCH in Table 6.4.2.2-1 shall be applied.

#### 6.4E.2.4 In-band emissions for V2X

For V2X sidelink physical channels PSCCH, PSSCH and PSBCH, the In-band emissions requirements shall be as specified for PUSCH in subclause 6.4.2.3 for the corresponding modulation and transmission bandwidth. When V2X transmissions are shortened due to transmission gap of one symbol at the end of the subframe, the In-band emissions measurement interval is reduced by one symbol, accordingly.

#### 6.4E.2.5 EVM equalizer spectrum flatness for V2X

For V2X sidelink physical channels PSCCH, PSSCH and PSBCH, the EVM equalizer spectrum flatness requirements shall be as specified for PUSCH in clause 6.4.2.4 for the corresponding modulation and transmission bandwidth.

#### 6.4E.2.6 Transmit modulation quality for V2X concurrent operation

For the inter-band concurrent NR V2X operation, the requirements specified in clause 6.4.2 shall apply for the uplink in licensed band and the requirements specified in clause 6.4E.2.1 through 6.4E.2.5 shall apply for the sidelink in licensed band or Band n47.

For the intra-band concurrent NR V2X operation, the requirements specified in clause 6.4.2 shall apply for the uplink in licensed band and the requirements specified in clause 6.4E.2 shall apply for the sidelink in licensed band.

## 6.4F Transmit signal quality for shared spectrum channel access

### 6.4F.1 Frequency error

The requirements for frequency error in clause 6.4.1 apply.

### 6.4F.2 Transmit modulation quality

#### 6.4F.2.0 General

Transmit modulation quality defines the modulation quality for expected in-channel RF transmissions from the UE. The transmit modulation quality is specified in terms of:

- Error Vector Magnitude (EVM) for the allocated resource blocks (RBs)
- EVM equalizer spectrum flatness derived from the equalizer coefficients generated by the EVM measurement process
- Carrier leakage
- In-band emissions for the non-allocated RB

All the parameters defined in clause 6.4.2 are defined using the measurement methodology specified in Annex F.

In case the parameter 3300 or 3301 is reported from UE via *txDirectCurrentLocation* IE (as defined in TS 38.331 [7]), carrier leakage measurement requirement in clause 6.4F.2.2 and 6.4F.2.3 shall be waived, and the RF correction with regard to the carrier leakage and IQ image shall be omitted during the calculation of transmit modulation quality.

#### 6.4F.2.1 Error Vector Magnitude

The requirements for Error Vector Magnitude in clause 6.4.2.1 apply.

#### 6.4F.2.2 Carrier leakage

The requirements for carrier leakage in clause 6.4.2.2 apply.

#### 6.4F.2.3 In-band emissions

The in-band emission is defined as the average emission across 12 sub-carriers and as a function of the RB offset from the edge of the allocated UL transmission bandwidth. The in-band emission is measured as the ratio of the UE output power in a non-allocated RB to the UE output power in an allocated RB.

The basic in-band emissions measurement interval is defined over one slot in the time domain; however, the minimum requirement applies when the in-band emission measurement is averaged over 10 sub-frames. When the PUSCH or PUCCH transmission slot is shortened, the in-band emissions measurement interval is reduced by one or more symbols, accordingly. The requirement applies for power class 5 UE for 20 MHz channel bandwidth and 15 kHz SCS,

Instead of the general requirement in clause 6.4.2.3, the average of the basic in-band emission measurement over 10 sub-frames shall not exceed the values specified in Table 6.4F.2.3-1.

**Table 6.4F.2.3-1: Minimum requirements for in-band emissions**

| Parameter description | Unit | Limit (NOTE 1) | Applicable Frequencies |
|-----------------------|------|----------------|------------------------|
|-----------------------|------|----------------|------------------------|



|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |                                                                                                                      |                                              |                                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------------|----------------------------------------------|--------------------------------|
| General                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | dB  | $\max \left\{ \begin{array}{l} -10 - 6( \Delta_{RB}  - 1), \\ -57 \frac{dBm}{180} kHz - P_{RB} \end{array} \right\}$ |                                              | Any non-allocated (NOTE 2)     |
| IQ Image                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | dB  | -28                                                                                                                  | Image frequencies when output power > 10 dBm | Image frequencies (NOTES 2, 3) |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     | -25                                                                                                                  | Image frequencies when output power ≤ 10 dBm |                                |
| Carrier leakage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | dBc | -28                                                                                                                  | Output power > 10 dBm                        | Carrier frequency (NOTES 4, 5) |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     | -25                                                                                                                  | 0 dBm ≤ Output power ≤10 dBm                 |                                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     | -20                                                                                                                  | -30 dBm ≤ Output power ≤ 0 dBm               |                                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     | -10                                                                                                                  | -40 dBm ≤ Output power < -30 dBm             |                                |
| NOTE 1: An in-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the minimum requirement is calculated as the higher of $P_{RB} - 30$ dB and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply. $P_{RB}$ is defined in NOTE 10.                                                                                                                                                                                                                                                                               |     |                                                                                                                      |                                              |                                |
| NOTE 2: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured average power per allocated RB, where the averaging is done across all allocated RBs. The requirement applies with $ \Delta_{RB}  \leq 5$ for any non-allocated RB with $RIV=1$ and $RIV=5$ in the uplink scheduling grant where $RIV$ is specified in [10].                                                                                                                                                                              |     |                                                                                                                      |                                              |                                |
| NOTE 3: [The applicable frequencies for this limit are those that are enclosed in the reflection of the allocated RBs, based on symmetry with respect to the reported carrier frequency location in <i>txDirectCurrentLocation</i> field of the <i>UplinkTxDirectCurrentBWP</i> , but excluding any allocated RBs. If <i>txDirectCurrentLocation</i> is not available or is reported with value 3300 or 3301, applicable frequencies shall be calculated with an assumed carrier frequency location at the center of the channel.]                                                  |     |                                                                                                                      |                                              |                                |
| NOTE 4: [The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured total power in all allocated RBs with $RIV=1$ and $RIV=5$ in the uplink scheduling grant.]                                                                                                                                                                                                                                                                                                                                               |     |                                                                                                                      |                                              |                                |
| NOTE 5: [The applicable frequencies for this limit are those that are enclosed in the RBs containing the DC frequency if $N_{RB}$ is odd, or in the two RBs immediately adjacent to the DC frequency if $N_{RB}$ is even, but excluding any allocated RB. The location of the DC frequency is given by <i>txDirectCurrentLocation</i> field of the <i>UplinkTxDirectCurrentBWP</i> . If <i>txDirectCurrentLocation</i> is not available or is reported with value 3300 or 3301, applicable frequencies shall be those that are enclosed in the RB(s) in the center of the channel.] |     |                                                                                                                      |                                              |                                |
| NOTE 6: $N_{RB}$ is the Transmission Bandwidth Configuration (see Figure 5.6-1).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |                                                                                                                      |                                              |                                |
| NOTE 7: $\Delta_{RB}$ is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g. $\Delta_{RB}=1$ or $\Delta_{RB}=-1$ for the first adjacent RB outside of the allocated bandwidth).                                                                                                                                                                                                                                                                                                                                                          |     |                                                                                                                      |                                              |                                |
| NOTE 10: $P_{RE}$ is the transmitted power per $180 \cdot 2^u$ kHz in allocated RBs, measured in dBm.                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |                                                                                                                      |                                              |                                |

#### 6.4F.2.4 EVM equalizer spectrum flatness

The requirements for EVM equalizer spectrum flatness in clause 6.4.2.4 apply.

### 6.4F.2A Transmit modulation quality for CA

#### 6.4F.2A.1 Transmit modulation quality for inter-band CA

For inter-band carrier aggregation with uplink assigned to two bands and including one of the bands listed in Table 6.2F.1-1, the transmit modulation quality requirements shall apply on the NR carrier as defined in clause 6.4.2 and on the carrier operating with shared spectrum access as defined in clause 6.4F.2. The requirements apply with all component carrier active: PCC with PRB allocation and SCC without PRB allocation and without CSI reporting and SRS configured.

## 6.4G Transmit signal quality for Tx Diversity

### 6.4G.1 Frequency error for Tx Diversity

For UE(s) supporting Tx diversity, the basic measurement interval of modulated carrier frequency is 1 UL slot. The mean value of basic measurements of UE modulated carrier frequency at each transmit antenna connector shall be accurate to within  $\pm 0.1$  PPM observed over a period of 1 ms of cumulated measurement intervals compared to the carrier frequency received from the NR Node B.

### 6.4G.2 Transmit modulation quality for Tx Diversity

#### 6.4G.2.0 General

For UE supporting Tx diversity, the transmit modulation quality requirements are specified based on measurements made at each transmit antenna connector. The transmit modulation quality is specified in terms of:

- Error Vector Magnitude (EVM) for the allocated resource blocks (RBs)
- EVM equalizer spectrum flatness derived from the equalizer coefficients generated by the EVM measurement process
- Carrier leakage (caused by IQ offset)
- In-band emissions for the non-allocated RB

In case the parameter 3300 or 3301 is reported from UE via *txDirectCurrentLocation* IE (as defined in TS 38.331 [7]), carrier leakage measurement requirement in clause 6.4.2.2 and 6.4.2.3 shall be waived, and the RF correction with regard to the carrier leakage and IQ image shall be omitted during the calculation of transmit modulation quality.

#### 6.4G.2.1 Error Vector Magnitude

For UE supporting Tx diversity, the Error Vector Magnitude requirements specified in clause 6.4.2.1. The total EVM requirement is derived based on the measurement at each antenna connector according to Annex F.8.

#### 6.4G.2.2 Carrier leakage

For UE supporting Tx diversity, the Relative Carrier Leakage Power requirements specified in Table 6.4.2.2-1 which is defined in clause 6.4.2.2 apply at each transmit antenna connector.

#### 6.4G.2.3 In-band emissions

For UE supporting Tx diversity, the In-band Emission requirements specified in Table 6.4.2.3-1 which is defined in clause 6.4.2.3 apply at each transmit antenna connector.

#### 6.4G.2.4 EVM equalizer spectrum flatness for Tx Diversity

For UE supporting Tx diversity, the EVM Equalizer Spectrum Flatness requirements specified in Table 6.4.2.4-1 and Table 6.4.2.4-2 which are defined in clause 6.4.2.4. The composite EVM equalizer  $EC(f)$  is defined as

$$EC(f) = \frac{P_1 \cdot |EC_1(f)| + P_2 \cdot |EC_2(f)|}{P_1 + P_2}$$

where

$EC_n(f)$  represents equalizer coefficient for each antenna connector,  $f \in F$ ,  $f$  is the allocated subcarriers within the transmission bandwidth ( $|F| = 12 \cdot L_{CRE}$ );

$P_1$  and  $P_2$  denote the linear power measured at each antenna connector respectively.

## 6.4H Transmit signal quality for CA with UL MIMO

### 6.4H.1 Transmit signal quality for intra-band UL contiguous CA with UL MIMO

#### 6.4H.1.1 Frequency error for intra-band UL contiguous CA with UL MIMO

For UE supporting intra-band UL contiguous CA and UL MIMO, the basic measurement interval of modulated carrier frequency is 1 UL slot. The mean value of basic measurements of UE modulated carrier frequency at each transmit antenna connector on each CC shall be accurate to within  $\pm 0.1$  PPM observed over a period of 1 ms of cumulated measurement intervals compared to the carrier frequency of primary component carrier received from the NR Node B.

#### 6.4H.1.2 Transmit modulation quality for intra-band UL contiguous CA with UL MIMO

##### 6.4H.1.2.0 General

For UE supporting intra-band UL contiguous CA and UL MIMO, the transmit modulation quality requirements are specified based on measurements made at each transmit antenna connector on each CC.

The requirements in this clause apply with PCC and SCC in the UL configured and activated: PCC with PRB allocation and SCC without PRB allocation and without CSI reporting and SRS configured.

If UE is scheduled for single antenna-port PUSCH transmission by DCI format 0\_0 or by DCI format 0\_1 for single antenna port codebook based transmission with precoding matrix  $W=1$  [6.3.1.5 TS 38.211], the requirements in clause 6.4A.2.1 apply.

The transmit modulation quality requirements listed below shall be met with UL MIMO configurations specified in Table 6.2D.1-2.

For all Transmit modulation quality requirements the Carrier leakage frequency is indicated by the UE with IE *UplinkTxDirectCurrentTwoCarrierList-r16* or *UplinkTxDirectCurrentMoreCarrierList-r17* or *UplinkTxDirectCurrentList*.

The carrier leakage measurement requirement in clauses 6.4H.1.2.2 and 6.4H.1.2.3 shall be waived and the UE's UL signal left uncorrected for carrier leakage when one of the following qualifying conditions apply:

1. UE reports the parameter 3300 or 3301
2. UE doesn't indicate the DC location parameters

Any requirement relaxation to accommodate the IQ image shall be omitted if the qualifying conditions above are present or if the IQ image frequency is outside the activated UL component carriers.

##### 6.4H.1.2.1 Error Vector Magnitude

For intra-band UL contiguous CA and UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the Error Vector Magnitude requirements specified in clause 6.4A.2.1.1 apply per layer.

##### 6.4H.1.2.2 Carrier leakage

For UE supporting intra-band UL contiguous CA and UL MIMO, the relative carrier leakage power requirements specified in clause 6.4A.2.1.3 apply at each transmit antenna connector.

### 6.4H.1.2.3 In-band emissions

For UE supporting intra-band UL contiguous CA and UL MIMO, the In-band emission requirements specified in clause 6.4A.2.1.2 apply at each transmit antenna connector.

### 6.4H.1.3 Time alignment error for intra-band UL contiguous CA with UL MIMO

For intra-band UL contiguous CA and UE(s) with multiple transmit antenna connectors supporting UL MIMO, this requirement applies as specified in clause 6.4D.3: The time alignment error (TAE) is defined as the average frame timing difference between any two transmissions on different transmit antenna connectors for each CC. For UE(s) with multiple transmit antenna connectors, the Time Alignment Error (TAE) shall not exceed 130 ns.

### 6.4H.1.4 Coherent UL MIMO requirement for intra-band UL contiguous CA with UL MIMO

For UE supporting intra-band UL contiguous CA and UL MIMO, the coherent UL MIMO requirement are specified on each CC as in clause 6.4D.4.

## 6.5 Output RF spectrum emissions

### 6.5.1 Occupied bandwidth

Occupied bandwidth is defined as the bandwidth containing 99 % of the total integrated mean power of the transmitted spectrum on the assigned channel. The occupied bandwidth for all transmission bandwidth configurations (Resources Blocks) shall be less than the channel bandwidth specified in Table 6.5.1-1.

**Table 6.5.1-1: Occupied channel bandwidth**

|                                  | NR channel bandwidth (MHz)                                 |
|----------------------------------|------------------------------------------------------------|
|                                  | 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100 |
| Occupied channel bandwidth (MHz) | Same as NR channel bandwidth                               |

### 6.5.2 Out of band emission

#### 6.5.2.1 General

The Out of band emissions are unwanted emissions immediately outside the assigned channel bandwidth resulting from the modulation process and non-linearity in the transmitter but excluding spurious emissions. This out of band emission limit is specified in terms of a spectrum emission mask and an adjacent channel leakage power ratio.

To improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

#### 6.5.2.2 Spectrum emission mask

The spectrum emission mask of the UE applies to frequencies ( $\Delta f_{\text{OoB}}$ ) starting from the  $\pm$  edge of the assigned NR channel bandwidth. For frequencies offset greater than  $\Delta f_{\text{OoB}}$ , the spurious requirements in clause 6.5.3 are applicable.

**NOTE:** For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

The power of any UE emission shall not exceed the levels specified in Table 6.5.2.2-1 for the specified channel bandwidth.

**Table 6.5.2.2-1: General NR spectrum emission mask**

| $\Delta f_{\text{OOB}}$<br>(MHz)                  | Channel bandwidth (MHz) / Spectrum emission limit (dBm) |                                |                         | Measurement<br>bandwidth |
|---------------------------------------------------|---------------------------------------------------------|--------------------------------|-------------------------|--------------------------|
|                                                   | 5                                                       | 10, 15, 20, 25, 30, 35, 40, 45 | 50, 60, 70, 80, 90, 100 |                          |
| $\pm 0-1$                                         | -13                                                     | -13                            |                         | 1 % of channel BW        |
| $\pm 0-1$                                         |                                                         |                                | -24                     | 30 kHz                   |
| $\pm 1-5$                                         | -10                                                     | -10                            |                         | 1 MHz                    |
| $\pm 5-6$                                         | -13                                                     |                                |                         |                          |
| $\pm 6-10$                                        | -25                                                     |                                |                         |                          |
| $\pm 5-BW_{\text{Channel}}$                       |                                                         | -13                            |                         |                          |
| $\pm BW_{\text{Channel}}-(BW_{\text{Channel}}+5)$ |                                                         | -25                            |                         |                          |

### 6.5.2.3 Additional spectrum emission mask

#### 6.5.2.3.1 Requirements for network signalling value "NS\_35"

Additional spectrum emission requirements are signalled by the network to indicate that the UE shall meet an additional requirement for a specific deployment scenario as part of the cell handover/broadcast message.

When "NS\_35" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.2.3.1-1.

**Table 6.5.2.3.1-1: Additional requirements for "NS\_35"**

| $\Delta f_{\text{OOB}}$<br>(MHz) | Channel bandwidth (MHz) / Spectrum emission limit (dBm) |                  |                  |     | Measurement<br>bandwidth |
|----------------------------------|---------------------------------------------------------|------------------|------------------|-----|--------------------------|
|                                  | 5                                                       | 10               | 15               | 20  |                          |
| $\pm 0-0.1$                      | -15                                                     | -18              | -20              | -21 | 30 kHz                   |
| $\pm 0.1-6$                      | -13                                                     | -13              | -13              | -13 | 100 kHz                  |
| $\pm 6-10$                       | -25 <sup>1</sup>                                        | -13              | -13              | -13 | 100 kHz                  |
| $\pm 10-15$                      |                                                         | -25 <sup>1</sup> | -13              | -13 | 100 kHz                  |
| $\pm 15-20$                      |                                                         |                  | -25 <sup>1</sup> | -13 | 100 kHz                  |
| $\pm 20-25$                      |                                                         |                  |                  | -25 | 1 MHz                    |

NOTE 1: The measurement bandwidth shall be 1 MHz

NOTE: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

#### 6.5.2.3.2 Requirements for network signalling value "NS\_04"

Additional spectrum emission requirements are signalled by the network to indicate that the UE shall meet an additional requirement for a specific deployment scenario as part of the cell handover/broadcast message. The additional spectrum emission requirements in NS\_04 are based on FCC rule 47 CFR 27.53(m)(4).

The n41 SEM transition point from -13 dBm/MHz to -25 dBm/MHz is based on the emission bandwidth. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power based on FCC rule 47 CFR 27.53(m)(6). Since the 26-dB emission bandwidth is implementation dependent, the maximum transmission bandwidth of the channel bandwidth in MHz (for CP-OFDM, this bandwidth equals  $N_{\text{RB}} * \text{SCS} * 12 / 1,000$ , and for DFT-S-OFDM, this bandwidth equals the maximum applicable  $L_{\text{CRB}} * \text{SCS} * 12 / 1,000$ ) contained within the 26 dB emission bandwidth is used for determining the applicable SEM indicated by NS\_04 as specified in Table 6.5.2.3.2-1 and Table 6.5.2.3.2-2.

**Table 6.5.2.3.2-1: transmission bandwidth determining the NS\_04 SEM for CP-OFDM**

| SCS (kHz) | Channel bandwidth (MHz) / Maximum transmission bandwidth (MHz) |      |       |       |       |       |       |       |       |       |       |       |       |       |       |
|-----------|----------------------------------------------------------------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|           | 5                                                              | 10   | 15    | 20    | 25    | 30    | 35    | 40    | 45    | 50    | 60    | 70    | 80    | 90    | 100   |
| 15        | 4.50                                                           | 9.36 | 14.22 | 19.08 | 23.94 | 28.80 | 33.84 | 38.88 | 43.56 | 48.6  | N/A   | N/A   | N/A   | N/A   | N/A   |
| 30        | N/A                                                            | 8.64 | 13.68 | 18.36 | 23.40 | 28.08 | 33.12 | 38.16 | 42.84 | 47.88 | 58.32 | 68.04 | 78.12 | 88.02 | 98.28 |
| 60        | N/A                                                            | 7.92 | 12.96 | 17.28 | 22.32 | 27.36 | 31.68 | 36.72 | 41.76 | 46.8  | 56.88 | 66.96 | 77.04 | 87.12 | 97.20 |

**Table 6.5.2.3.2-2: transmission bandwidth determining the NS\_04 SEM for DFT-S-OFDM**

| SCS (kHz) | Channel bandwidth (MHz) / Maximum transmission bandwidth (MHz) |      |       |       |       |       |       |       |       |       |       |       |       |       |       |
|-----------|----------------------------------------------------------------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|           | 5                                                              | 10   | 15    | 20    | 25    | 30    | 35    | 40    | 45    | 50    | 60    | 70    | 80    | 90    | 100   |
| 15        | 4.50                                                           | 9.00 | 13.50 | 18.00 | 23.04 | 28.80 | 32.40 | 38.88 | 43.20 | 48.60 | N/A   | N/A   | N/A   | N/A   | N/A   |
| 30        | N/A                                                            | 8.64 | 12.96 | 18.00 | 23.04 | 27.00 | 32.40 | 36.00 | 38.88 | 46.08 | 58.32 | 64.80 | 77.76 | 87.48 | 97.20 |
| 60        | N/A                                                            | 7.20 | 12.96 | 17.28 | 21.60 | 25.92 | 28.80 | 36.00 | 38.88 | 46.08 | 54.00 | 64.80 | 72.00 | 86.40 | 97.20 |

When "NS\_04" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.2.3.2-3.

**Table 6.5.2.3.2-3: n41 and n90 SEM with "NS\_04"**

| $\Delta f_{\text{OoB}}$<br>MHz                                                                                                                                                        | Channel bandwidth (MHz) / Spectrum emission limit (dBm) |    |    |    |    |    |    |    |    |    |     |    |    |    |     |  | Measurement<br>bandwidth |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|----|----|----|----|----|----|----|----|----|-----|----|----|----|-----|--|--------------------------|
|                                                                                                                                                                                       | 5                                                       | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 60  | 70 | 80 | 90 | 100 |  |                          |
| $\pm 0 - 1$                                                                                                                                                                           | -10                                                     |    |    |    |    |    |    |    |    |    |     |    |    |    |     |  | 2 % channel<br>bandwidth |
|                                                                                                                                                                                       |                                                         |    |    |    |    |    |    |    |    |    | -10 |    |    |    |     |  | 1 MHz                    |
| $\pm 1 - 5$                                                                                                                                                                           |                                                         |    |    |    |    |    |    |    |    |    | -10 |    |    |    |     |  | 1 MHz                    |
| $\pm 5 - X$                                                                                                                                                                           |                                                         |    |    |    |    |    |    |    |    |    | -13 |    |    |    |     |  |                          |
| $\pm X - (\text{BW}_{\text{Channel}} + 5 \text{ MHz})$                                                                                                                                |                                                         |    |    |    |    |    |    |    |    |    | -25 |    |    |    |     |  |                          |
| NOTE 1: $X = \text{MAX}(6, \text{maximum transmission bandwidth})$ , where maximum transmission bandwidth is defined in Table 6.5.2.3.2-1 for CP-OFDM and 6.5.2.3.2-2 for DFT-S-OFDM. |                                                         |    |    |    |    |    |    |    |    |    |     |    |    |    |     |  |                          |

### 6.5.2.3.3 Requirements for network signalling values "NS\_03" and "NS\_03U"

Additional spectrum emission requirements are signalled by the network to indicate that the UE shall meet an additional requirement for a specific deployment scenario as part of the cell handover/broadcast message.

When "NS\_03" or "NS\_03U" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.2.3.3-1.

**Table 6.5.2.3.3-1: Additional requirements for "NS\_03" and "NS\_03U"**

| $\Delta f_{\text{OoB}}$ MHz                                         | Channel bandwidth (MHz) / Spectrum emission limit (dBm) |                                | Measurement bandwidth |
|---------------------------------------------------------------------|---------------------------------------------------------|--------------------------------|-----------------------|
|                                                                     | 5                                                       | 10, 15, 20, 25, 30, 35, 40, 45 |                       |
| $\pm 0-1$                                                           | -13                                                     | -13                            | 1 % of channel BW     |
| $\pm 1-6$                                                           | -13                                                     |                                | 1 MHz                 |
| $\pm 6-10$                                                          | -25                                                     |                                |                       |
| $\pm 1-\text{BW}_{\text{Channel}}$                                  |                                                         | -13                            |                       |
| $\pm \text{BW}_{\text{Channel}} - (\text{BW}_{\text{Channel}} + 5)$ |                                                         | -25                            |                       |

NOTE: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

**Table 6.5.2.3.3-2: Void****6.5.2.3.4 Requirements for network signalling value "NS\_06" or "NS\_07"**

Additional spectrum emission requirements are signalled by the network to indicate that the UE shall meet an additional requirement for a specific deployment scenario as part of the cell handover/broadcast message.

When "NS\_06" or "NS\_07" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.2.3.4-1.

**Table 6.5.2.3.4-1: Additional requirements for "NS\_06" or "NS\_07"**

| $\Delta f_{\text{OBS}}$<br>(MHz) | Channel bandwidth (MHz) / Spectrum emission limit (dBm) |     |     | Measurement bandwidth |
|----------------------------------|---------------------------------------------------------|-----|-----|-----------------------|
|                                  | 5                                                       | 10  | 15  |                       |
| $\pm 0 - 0.1$                    | -15                                                     | -18 | -20 | 30 kHz                |
| $\pm 0.1 - 1$                    | -13                                                     | -13 | -13 | 100 kHz               |
| $\pm 1 - 6$                      | -13                                                     | -13 | -13 | 1 MHz                 |
| $\pm 6 - 10$                     | -25                                                     |     |     |                       |
| $\pm 10 - 15$                    |                                                         |     |     |                       |
| $\pm 15 - 20$                    |                                                         |     | -25 |                       |

NOTE: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

**6.5.2.3.5 Void****6.5.2.3.6 Void****6.5.2.3.7 Void****6.5.2.3.8 Requirements for network signalling value "NS\_27"**

Additional spectrum emission requirements are signalled by the network to indicate that the UE shall meet an additional requirement for a specific deployment scenario as part of the cell handover/broadcast message.

When "NS\_27" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.2.3.8-1.

**Table 6.5.2.3.8-1: Additional requirements for "NS\_27"**

| $\Delta f_{\text{OBS}}$<br>MHz | Channel bandwidth (MHz) / Spectrum emission limit (dBm) |    |    |    |    |    | Measurement bandwidth |
|--------------------------------|---------------------------------------------------------|----|----|----|----|----|-----------------------|
|                                | 5                                                       | 10 | 15 | 20 | 30 | 40 |                       |
| $\pm 0 - 1$                    | -13                                                     |    |    |    |    |    | 1 % channel bandwidth |
| $\pm 1 - X$                    | -13                                                     |    |    |    |    |    | 1 MHz                 |

|                                                                                       |     |  |
|---------------------------------------------------------------------------------------|-----|--|
| < - X or > X                                                                          | -25 |  |
| NOTE 1: X is occupied channel bandwidth as defined in Table 6.5.1-1.                  |     |  |
| NOTE 2: The requirements apply only at the frequency range from 3540 MHz to 3710 MHz. |     |  |

NOTE: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

#### 6.5.2.3.9 Requirements for network signalling value "NS\_21"

Additional spectrum emission requirements are signalled by the network to indicate that the UE shall meet an additional requirement for a specific deployment scenario as part of the cell handover/broadcast message.

When "NS\_21" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.2.3.9-1.

**Table 6.5.2.3.y-1: Additional requirements for "NS\_21"**

| $\Delta f_{\text{OoB}}$<br>MHz | Channel bandwidth (MHz) /<br>Spectrum emission limit (dBm) |     | Measurement<br>bandwidth |
|--------------------------------|------------------------------------------------------------|-----|--------------------------|
|                                | 5                                                          | 10  |                          |
| $\pm 0$ -1                     | -13                                                        | -13 | 1 MHz                    |
| $\pm 1$ -6                     | -13                                                        | -13 | 1 MHz                    |
| $\pm 6$ -10                    | -25                                                        | -13 | 1 MHz                    |
| $\pm 10$ -15                   |                                                            | -25 | 1 MHz                    |

NOTE 1: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

NOTE 2: For  $\Delta f_{\text{OoB}} = \pm 0$ -1MHz, a resolution bandwidth of as close as possible to, without being less than 1% of the channel bandwidth, shall be employed provided that the measured power is integrated over the full required measurement bandwidth of 1 MHz.

#### 6.5.2.4 Adjacent channel leakage ratio

Adjacent Channel Leakage power Ratio (ACLR) is the ratio of the filtered mean power centred on the assigned channel frequency to the filtered mean power centred on an adjacent channel frequency.

To improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

##### 6.5.2.4.1 NR ACLR

NR Adjacent Channel Leakage power Ratio ( $\text{NR}_{\text{ACLR}}$ ) is the ratio of the filtered mean power centred on the assigned NR channel frequency to the filtered mean power centred on an adjacent NR channel frequency at nominal channel spacing.

The assigned NR channel power and adjacent NR channel power are measured with rectangular filters with measurement bandwidths specified in Table 6.5.2.4.1-1.



If the measured adjacent channel power is greater than –50 dBm then the  $NR_{ACLR}$  shall be higher than the value specified in Table 6.5.2.4.1-2.

**Table 6.5.2.4.1-1: NR ACLR measurement bandwidth**

|                                                                                                                           |       |                                          |                 |
|---------------------------------------------------------------------------------------------------------------------------|-------|------------------------------------------|-----------------|
| <b>Channel bandwidth</b>                                                                                                  | (MHz) | 5,10,15,20,25,30,35,40,45,50             | 60,70,80,90,100 |
| <b>REF_SCS</b>                                                                                                            | (kHz) | 15                                       | 30              |
| <b>NR ACLR measurement bandwidth</b>                                                                                      | (MHz) | MBW=REF_SCS*(12*N <sub>RB</sub> +1)/1000 |                 |
| NOTE : “N <sub>RB</sub> ” in the formula is the maximum transmission bandwidth configuration as defined in Table 5.3.2-1. |       |                                          |                 |

**Table 6.5.2.4.1-2: NR ACLR requirement**

|                | <b>Power class 1</b> | <b>Power class 1.5</b> | <b>Power class 2</b> | <b>Power class 3</b> |
|----------------|----------------------|------------------------|----------------------|----------------------|
| <b>NR ACLR</b> | 37 dB                | 31 dB                  | 31 dB                | 30 dB                |
| NOTE 1: Void   |                      |                        |                      |                      |

#### 6.5.2.4.2 UTRA ACLR

UTRA adjacent channel leakage power ratio ( $UTRA_{ACLR}$ ) is the ratio of the filtered mean power centred on the assigned NR channel frequency to the filtered mean power centred on an adjacent(s) UTRA channel frequency.

$UTRA_{ACLR}$  is specified for the first adjacent UTRA channel ( $UTRA_{ACLR1}$ ) which center frequency is  $\pm 2.5$  MHz from NR channel edge and for the 2<sup>nd</sup> adjacent UTRA channel ( $UTRA_{ACLR2}$ ) which center frequency is  $\pm 7.5$  MHz from NR channel edge.

The UTRA channel power is measured with a RRC filter with roll-off factor  $\alpha = 0.22$  and bandwidth of 3.84 MHz. The assigned NR channel power is measured with a rectangular filter with measurement bandwidth specified in Table 6.5.2.4.1-1.

If the measured adjacent channel power is greater than – 50 dBm then the  $UTRA_{ACLR1}$  and  $UTRA_{ACLR2}$  shall be higher than the value specified in Table 6.5.2.4.2-1.

**Table 6.5.2.4.2-1: UTRA ACLR requirement**

|                                  | <b>Power class 3</b> |
|----------------------------------|----------------------|
| <b><math>UTRA_{ACLR1}</math></b> | 33 dB                |
| <b><math>UTRA_{ACLR2}</math></b> | 36 dB                |

UTRA ACLR requirement is applicable when the network signalling value NS\_03U, NS\_05U, NS\_43U or NS\_100 is signalled by the network in the field *additionalSpectrumEmission*.

### 6.5.3 Spurious emissions

#### 6.5.3.0 General

Spurious emissions are emissions which are caused by unwanted transmitter effects such as harmonics emission, parasitic emissions, intermodulation products and frequency conversion products, but exclude out of band emissions unless otherwise stated. The spurious emission limits are specified in terms of general requirements in line with SM.329 [9] and NR operating band requirement to address UE co-existence.

To improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

### 6.5.3.1 General spurious emissions

Unless otherwise stated, the spurious emission limits apply for the frequency ranges that are more than  $F_{OOB}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth. The spurious emission limits in Table 6.5.3.1-2 apply for all transmitter band configurations ( $N_{RB}$ ) and channel bandwidths.

**Table 6.5.3.1-1: Boundary between NR out of band and general spurious emission domain**

| Channel bandwidth | OOB boundary $F_{OOB}$ (MHz) |
|-------------------|------------------------------|
| $BW_{channel}$    | $BW_{channel} + 5$           |

**Table 6.5.3.1-2: Requirement for general spurious emissions limits**

| Frequency Range                                                                                                                                                                              | Maximum Level | Measurement bandwidth | NOTE |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-----------------------|------|
| $9 \text{ kHz} \leq f < 150 \text{ kHz}$                                                                                                                                                     | -36 dBm       | 1 kHz                 |      |
| $150 \text{ kHz} \leq f < 30 \text{ MHz}$                                                                                                                                                    | -36 dBm       | 10 kHz                |      |
| $30 \text{ MHz} \leq f < 1000 \text{ MHz}$                                                                                                                                                   | -36 dBm       | 100 kHz               |      |
| $1 \text{ GHz} \leq f < 12.75 \text{ GHz}$                                                                                                                                                   | -30 dBm       | 1 MHz                 | 4    |
|                                                                                                                                                                                              | -25 dBm       | 1 MHz                 | 3    |
| $12.75 \text{ GHz} \leq f < 5^{\text{th}}$ harmonic of the upper frequency edge of the UL operating band in GHz                                                                              | -30 dBm       | 1 MHz                 | 1    |
| $12.75 \text{ GHz} < f < 26 \text{ GHz}$                                                                                                                                                     | -30 dBm       | 1 MHz                 | 2    |
| NOTE 1: Applies for Band for which the upper frequency edge of the UL Band is greater than 2.55 GHz and less than or equal to 5.2 GHz                                                        |               |                       |      |
| NOTE 2: Applies for Band that the upper frequency edge of the UL Band more than 5.2 GHz                                                                                                      |               |                       |      |
| NOTE 3: Applies for Band n41, CA configurations including Band n41, and EN-DC configurations that include n41 specified in clause 5.2B of TS 38.101-3 [3] when NS_04 is signalled.           |               |                       |      |
| NOTE 4: Does not apply for Band n41, CA configurations including Band n41, and EN-DC configurations that include n41 specified in subclause 5.2B of TS 38.101-3 [3] when NS_04 is signalled. |               |                       |      |

### 6.5.3.2 Spurious emissions for UE co-existence

This clause specifies the requirements for NR bands for coexistence with protected bands.

**Table 6.5.3.2-1: Requirements for spurious emissions for UE co-existence**

| NR Band | Spurious emission for UE co-existence                                                                                                                                          |                       |   |                      |                     |           |      |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---|----------------------|---------------------|-----------|------|
|         | Protected band                                                                                                                                                                 | Frequency range (MHz) |   |                      | Maximum Level (dBm) | MBW (MHz) | NOTE |
| n1, n84 | E-UTRA Band 1, 5, 7, 8, 11, 18, 19, 20, 21, 22, 26, 27, 28, 31, 32, 38, 40, 41, 42, 43, 44, 45, 50, 51, 52, 65, 67, 68, 69, 72, 73, 74, 75, 76<br>NR Band n78, n79, n100, n104 | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |      |
|         | NR Band n77                                                                                                                                                                    | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2    |

| NR Band           | Spurious emission for UE co-existence                                                                                                                                                                 |                       |   |                      |                     |           |            |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---|----------------------|---------------------|-----------|------------|
|                   | Protected band                                                                                                                                                                                        | Frequency range (MHz) |   |                      | Maximum Level (dBm) | MBW (MHz) | NOTE       |
|                   | E-UTRA Band 3                                                                                                                                                                                         | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 15         |
|                   | E-UTRA Band 34                                                                                                                                                                                        | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 15, 47     |
|                   | Frequency range                                                                                                                                                                                       | 1880                  | - | 1895                 | -40                 | 1         | 15, 27     |
|                   | Frequency range                                                                                                                                                                                       | 1895                  | - | 1915                 | -15.5               | 5         | 15, 26, 27 |
|                   | Frequency range                                                                                                                                                                                       | 1915                  | - | 1920                 | +1.6                | 5         | 15, 26, 27 |
| n2                | E-UTRA Band 4, 5, 7, 12, 13, 14, 17, 24, 26, 27, 28, 29, 30, 41, 42, 50, 51, 53, 66, 70, 71, 74, 85, 103                                                                                              | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |            |
|                   | E-UTRA Band 2, 25                                                                                                                                                                                     | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 15         |
|                   | E-UTRA Band 43, 48<br>NR Band n77                                                                                                                                                                     | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2          |
| n3, n80           | E-UTRA Band 1, 5, 7, 8, 20, 26, 27, 28, 31, 32, 33, 34, 38, 39, 40, 41, 43, 44, 45, 50, 51, 65, 67, 68, 69, 72, 73, 74, 75, 76<br>NR Band n79, n100, n101                                             | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |            |
|                   | E-UTRA Band 3                                                                                                                                                                                         | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 15         |
|                   | E-UTRA Band 11, 18, 19, 21                                                                                                                                                                            | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |            |
|                   | E-UTRA Band 22, 42, 52<br>NR Band n77, n78, n104                                                                                                                                                      | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2          |
|                   | Frequency range                                                                                                                                                                                       | 1884.5                | - | 1915.7               | -41                 | 0.3       | 8          |
| n5, n89           | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 12, 13, 14, 17, 18, 19, 24, 25, 26, 28, 29, 30, 31, 34, 38, 40, 42, 43, 45, 48, 50, 51, 65, 66, 70, 71, 73, 74, 85, 103<br>NR Band n79                               | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |            |
|                   | E-UTRA Band 41, 52, 53<br>NR Band n77, n78                                                                                                                                                            | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2          |
|                   | E-UTRA Band 11, 21                                                                                                                                                                                    | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |            |
|                   | Frequency range                                                                                                                                                                                       | 1884.5                | - | 1915.7               | -41                 | 0.3       | 8          |
| n7                | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 12, 13, 14, 17, 20, 22, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 40, 42, 43, 50, 51, 52, 65, 66, 67, 68, 71, 72, 74, 75, 76, 85, 103,<br>NR Band n77, n78, n100, n101 | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |            |
|                   | NR Band n79                                                                                                                                                                                           | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2          |
|                   | Frequency range                                                                                                                                                                                       | 2570                  | - | 2575                 | +1.6                | 5         | 15, 21, 26 |
|                   | Frequency range                                                                                                                                                                                       | 2575                  | - | 2595                 | -15.5               | 5         | 15, 21, 26 |
|                   | Frequency range                                                                                                                                                                                       | 2595                  | - | 2620                 | -40                 | 1         | 15, 21     |
| n8, n81, n93, n94 | E-UTRA Band 1, 20, 28, 31, 32, 33, 34, 38, 39, 40, 45, 50, 51, 65, 67, 68, 69, 72, 73, 74, 75, 76<br>NR Band n101, n104                                                                               | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |            |
|                   | E-UTRA band 3, 7, 22, 41, 42, 43, 52,<br>NR Band n77, n78, n79                                                                                                                                        | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2          |
|                   | E-UTRA 8                                                                                                                                                                                              | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 15         |
|                   | E-UTRA Band 11, 21                                                                                                                                                                                    | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |            |
|                   | Frequency range                                                                                                                                                                                       | 1884.5                | - | 1915.7               | -41                 | 0.3       | 8          |
| n12               | E-UTRA Band 2, 5, 13, 14, 17, 24, 25, 26, 27, 30, 41, 53, 70, 71, 74, 103                                                                                                                             | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |            |
|                   | E-UTRA Band 4, 48, 50, 51, 66                                                                                                                                                                         | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2          |

| NR Band            | Spurious emission for UE co-existence                                                                                                              |                       |   |                      |                     |           |            |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---|----------------------|---------------------|-----------|------------|
|                    | Protected band                                                                                                                                     | Frequency range (MHz) |   |                      | Maximum Level (dBm) | MBW (MHz) | NOTE       |
| n13                | NR Band n77                                                                                                                                        |                       |   |                      |                     |           |            |
|                    | E-UTRA Band 12, 85                                                                                                                                 | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 15         |
|                    | E-UTRA Band 2, 4, 5, 12, 13, 17, 25, 26, 27, 29, 41, 48, 50, 51, 53, 66, 70, 71, 74, 85                                                            | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |            |
|                    | E-UTRA Band 14, 103                                                                                                                                | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 15         |
|                    | E-UTRA Band 24, 30<br>NR Band n77                                                                                                                  | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2          |
|                    | Frequency range                                                                                                                                    | 769                   | - | 775                  | -35                 | 0.00625   | 15         |
|                    | Frequency range                                                                                                                                    | 799                   | - | 805                  | -35                 | 0.00625   | 11, 15     |
| n14                | E-UTRA Band 2, 4, 5, 12, 13, 14, 17, 23, 24, 25, 26, 27, 29, 30, 41, 48, 53, 66, 70, 71, 85, 103                                                   | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |            |
|                    | NR Band n77                                                                                                                                        | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2          |
|                    | Frequency range                                                                                                                                    | 769                   | - | 775                  | -35                 | 0.00625   | 12, 15     |
|                    | Frequency range                                                                                                                                    | 799                   | - | 805                  | -35                 | 0.00625   | 11, 12, 15 |
| n18                | E-UTRA Band 1, 3, 11, 21, 34, 40, 42, 65<br>NR Band n79                                                                                            | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |            |
|                    | NR Band n77, n78                                                                                                                                   | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2          |
|                    | Frequency range                                                                                                                                    | 758                   | - | 799                  | -50                 | 1         |            |
|                    | Frequency range                                                                                                                                    | 799                   | - | 803                  | -40                 | 1         |            |
|                    | Frequency range                                                                                                                                    | 860                   | - | 890                  | -40                 | 1         |            |
|                    | Frequency range                                                                                                                                    | 945                   | - | 960                  | -50                 | 1         |            |
|                    | Frequency range                                                                                                                                    | 1884.5                | - | 1915.7               | -41                 | 0.3       | 8          |
|                    | Frequency range                                                                                                                                    | 2545                  | - | 2575                 | -50                 | 1         |            |
|                    | Frequency range                                                                                                                                    | 2595                  | - | 2645                 | -50                 | 1         |            |
| n20, n82, n91, n92 | E-UTRA Band 1, 3, 7, 8, 22, 31, 32, 33, 34, 40, 43, 50, 51, 65, 67, 68, 72, 74, 75, 76<br>NR Band n100, n101, n104                                 | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |            |
|                    | E-UTRA Band 20                                                                                                                                     | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 15         |
|                    | E-UTRA Band 38, 42, 52, 69<br>NR Band n77, n78                                                                                                     | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2          |
|                    | Frequency range                                                                                                                                    | 758                   | - | 788                  | -50                 | 1         |            |
|                    |                                                                                                                                                    |                       |   |                      |                     |           |            |
| n24, n99           | E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 24, 25, 26, 29, 30, 41, 48, 66, 70, 71, 85, 103                                                           | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |            |
|                    | NR Band n77                                                                                                                                        | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2          |
| n25                | E-UTRA Band 4, 5, 7, 12, 13, 14, 17, 24, 26, 27, 28, 29, 30, 41, 42, 53, 66, 70, 71, 85, 103                                                       | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |            |
|                    | E-UTRA Band 2                                                                                                                                      | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 15         |
|                    | E-UTRA Band 25                                                                                                                                     | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 15         |
|                    | E-UTRA Band 43, 48<br>NR Band n77                                                                                                                  | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2          |
| n26                | E-UTRA Band 1, 2, 3, 4, 5, 11, 12, 13, 14, 17, 18, 19, 21, 24, 25, 26, 29, 30, 31, 34, 39, 40, 42, 43, 48, 50, 51, 65, 66, 70, 71, 73, 74, 85, 103 | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |            |
|                    | E-UTRA Band 41, 53<br>NR Band n77, n78, n79                                                                                                        | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2          |
|                    | Frequency range                                                                                                                                    | 703                   | - | 799                  | -50                 | 1         |            |
|                    | Frequency range                                                                                                                                    | 799                   | - | 803                  | -40                 | 1         | 15         |
|                    | Frequency range                                                                                                                                    | 945                   | - | 960                  | -50                 | 1         |            |
|                    | Frequency range                                                                                                                                    | 1884.5                | - | 1915.7               | -41                 | 0.3       | 8          |

| NR Band  | Spurious emission for UE co-existence                                                                                                                                                 |                       |   |                      |                     |           |            |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---|----------------------|---------------------|-----------|------------|
|          | Protected band                                                                                                                                                                        | Frequency range (MHz) |   |                      | Maximum Level (dBm) | MBW (MHz) | NOTE       |
| n28, n83 | E-UTRA Band 1, 4, 22, 32, 42, 43, 50, 51, 65, 66, 74, 75, 76<br>NR Band n77, n78, n100, n101                                                                                          | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2          |
|          | E-UTRA Band 1                                                                                                                                                                         | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 19, 25     |
|          | E-UTRA Band 2, 3, 5, 7, 8, 18, 19, 20, 25, 26, 27, 31, 34, 38, 39, 40, 41, 52, 72, 73<br>NR Band n79                                                                                  | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |            |
|          | E-UTRA Band 11, 21                                                                                                                                                                    | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 19, 24     |
|          | Frequency range                                                                                                                                                                       | 470                   | - | 694                  | -42                 | 8         | 15, 35     |
|          | Frequency range                                                                                                                                                                       | 470                   | - | 710                  | -26.2               | 6         | 34         |
|          | Frequency range                                                                                                                                                                       | 662                   | - | 694                  | -26.2               | 6         | 15         |
|          | Frequency range                                                                                                                                                                       | 758                   | - | 773                  | -32                 | 1         | 15         |
|          | Frequency range                                                                                                                                                                       | 773                   | - | 803                  | -50                 | 1         |            |
|          | Frequency range                                                                                                                                                                       | 1884.5                | - | 1915.7               | -41                 | 0.3       | 8, 19      |
|          | Frequency range                                                                                                                                                                       | 1884.5                | - | 1915.7               | -41                 | 0.3       | 8          |
| n30      | E-UTRA Band 2, 4, 5, 7, 12, 13, 14, 17, 24, 25, 26, 27, 29, 30, 38, 41, 48, 53, 66, 70, 71, 85, 103<br>NR Band n77                                                                    | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |            |
| n34      | E-UTRA Band 1, 3, 7, 8, 11, 18, 19, 20, 21, 22, 26, 28, 31, 32, 33, 38, 39, 40, 41, 42, 43, 44, 45, 50, 51, 52, 65, 67, 69, 72, 74, 75, 76<br>NR Band n78, n79, n100, n101            | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 5          |
|          | NR Band n77                                                                                                                                                                           | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2          |
|          | Frequency range                                                                                                                                                                       | 1884.5                | - | 1915.7               | -41                 | 0.3       | 8          |
| n38      | E-UTRA Band 1, 2, 3, 4, 5, 8, 12, 13, 14, 17, 20, 22, 27, 28, 29, 30, 31, 32, 33, 34, 40, 42, 43, 50, 51, 52, 65, 66, 67, 68, 72, 74, 75, 76, 85, 103<br>NR Band n100, n101           | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |            |
|          | NR Band n77, n78, n79                                                                                                                                                                 | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |            |
|          | Frequency range                                                                                                                                                                       | 2620                  | - | 2645                 | -15.5               | 5         | 15, 22, 26 |
|          | Frequency range                                                                                                                                                                       | 2645                  | - | 2690                 | -40                 | 1         | 15, 22     |
| n39, n98 | E-UTRA Band 1, 8, 22, 26, 28, 34, 40, 41, 42, 44, 45, 50, 51, 52, 74<br>NR Band n79                                                                                                   | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |            |
|          | NR Band n77, n78                                                                                                                                                                      | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2          |
|          | Frequency range                                                                                                                                                                       | 1805                  | - | 1855                 | -40                 | 1         | 33         |
|          | Frequency range                                                                                                                                                                       | 1855                  | - | 1880                 | -15.5               | 5         | 15, 26, 33 |
| n40, n97 | E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 20, 21, 22, 26, 27, 28, 31, 32, 33, 34, 38, 39, 41, 42, 43, 44, 45, 50, 51, 52, 65, 67, 68, 69, 72, 74, 75, 76<br>NR Band n77, n78, n100, n101 | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 44         |
|          | NR Band n79                                                                                                                                                                           | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2          |
|          | Frequency range                                                                                                                                                                       | 1884.5                | - | 1915.7               | -41                 | 0.3       | 8          |
| n41      | E-UTRA Band 1, 2, 3, 4, 5, 8, 12, 13, 14, 17, 24, 25, 26, 27, 28, 29, 30, 34, 39, 42, 44, 45, 48, 50, 51, 52, 65, 66, 70, 71, 73, 74, 85, 103<br>NR Band n77, n78                     | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |            |
|          | E-UTRA Band 40                                                                                                                                                                        | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -40                 | 1         |            |

| NR Band  | Spurious emission for UE co-existence                                                                                                                                 |                       |   |                      |                     |           |            |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---|----------------------|---------------------|-----------|------------|
|          | Protected band                                                                                                                                                        | Frequency range (MHz) |   |                      | Maximum Level (dBm) | MBW (MHz) | NOTE       |
|          | NR Band n79                                                                                                                                                           | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2          |
|          | E-UTRA Band 11, 18, 19, 21                                                                                                                                            | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |            |
|          | Frequency range                                                                                                                                                       | 1884.5                |   | 1915.7               | -41                 | 0.3       | 8          |
|          | Frequency range                                                                                                                                                       | 2530                  | - | 2535                 | -25                 | 1         | 48         |
|          | Frequency range                                                                                                                                                       | 2505                  | - | 2530                 | -30                 | 1         | 48         |
| n47      | E-UTRA Band 1, 3, 5, 7, 8, 22, 26, 28, 34, 39, 40, 41, 42, 44, 45, 65, 68, 72, 73                                                                                     | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |            |
|          | NR Band n71, n77, n78, n79                                                                                                                                            | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |            |
| n48      | E-UTRA Band 2, 4, 5, 12, 13, 14, 17, 24, 25, 26, 29, 30, 41, 50, 51, 66, 70, 71, 74, 85, 103                                                                          | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |            |
| n50      | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 12, 13, 17, 20, 26, 28, 29, 31, 34, 38, 39, 40, 41, 42, 43, 48, 65, 66, 67, 68, 103<br>NR Band n100, n101                            | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |            |
| n51      | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 12, 13, 17, 20, 26, 28, 29, 31, 34, 38, 39, 40, 41, 42, 43, 48, 52, 65, 66, 67, 68, 85, 103<br>NR Band n100, n101                    | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |            |
| n53      | E-UTRA Band 2, 4, 5, 12, 13, 14, 17, 24, 25, 26, 29, 30, 48, 66, 70, 71, 85, 103<br>NR Band n77                                                                       | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |            |
| n65      | E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 20, 21, 22, 26, 27, 28, 31, 32, 38, 40, 41, 42, 43, 50, 51, 65, 68, 69, 72, 74, 75, 76<br>NR Band n78, n79, n100               | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |            |
|          | NR Band n77                                                                                                                                                           | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2          |
|          | E-UTRA Band 34                                                                                                                                                        | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 43         |
|          | Frequency range                                                                                                                                                       | 1900                  | - | 1915                 | -15.5               | 5         | 15, 26, 27 |
|          | Frequency range                                                                                                                                                       | 1915                  | - | 1920                 | +1.6                | 5         | 15, 26, 27 |
| n66, n86 | E-UTRA Band 2, 4, 5, 7, 12, 13, 14, 17, 25, 26, 27, 28, 29, 30, 38, 41, 43, 50, 51, 53, 66, 70, 71, 74, 85, 103                                                       | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |            |
|          | E-UTRA Band 42, 48<br>NR Band n77                                                                                                                                     | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2          |
| n70      | E-UTRA Band 2, 4, 5, 12, 13, 14, 17, 24, 25, 26, 29, 30, 41, 47, 48, 66, 70, 71, 85, 103                                                                              | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |            |
|          | NR Band n77                                                                                                                                                           | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2          |
| n71      | E-UTRA Band 4, 5, 12, 13, 14, 17, 24, 26, 30, 48, 53, 66, 85, 103                                                                                                     | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |            |
|          | E-UTRA Band 2, 7, 25, 41, 70, NR Band n77                                                                                                                             | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2          |
|          | E-UTRA Band 29                                                                                                                                                        | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -38                 | 1         | 15         |
|          | E-UTRA Band 71                                                                                                                                                        | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 15         |
| n74      | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 12, 13, 17, 18, 19, 20, 26, 28, 29, 31, 34, 38, 39, 40, 41, 42, 43, 48, 52, 65, 66, 67, 68, 85<br>NR Band n77, n78, n100, n101, n103 | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |            |
|          | NR Band n79                                                                                                                                                           | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2          |

| NR Band                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Spurious emission for UE co-existence                                                                                                                                  |                       |   |                      |                     |           |        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---|----------------------|---------------------|-----------|--------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Protected band                                                                                                                                                         | Frequency range (MHz) |   |                      | Maximum Level (dBm) | MBW (MHz) | NOTE   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Frequency range                                                                                                                                                        | 1884.5                | - | 1915.7               | -41                 | 0.3       | 8      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Frequency range                                                                                                                                                        | 1400                  | - | 1427                 | -32                 | 27        | 15, 41 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Frequency range                                                                                                                                                        | 1475                  | - | 1488                 | -28                 | 1         | 15, 42 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Frequency range                                                                                                                                                        | 1475                  | - | 1488                 | -50                 | 1         | 15, 45 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Frequency range                                                                                                                                                        | 1475.9                | - | 1510.9               | -35                 | 1         | 15, 46 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Frequency range                                                                                                                                                        | 1488                  | - | 1518                 | -50                 | 1         | 15     |
| n77                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 11, 12, 13, 14, 17, 18, 19, 20, 21, 24, 25, 26, 27, 28, 29, 30, 34, 39, 40, 41, 53, 65, 66, 70, 71, 74, 85, 103<br>NR Band n100, n101 | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | NR Band n104                                                                                                                                                           | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Frequency range                                                                                                                                                        | 1884.5                | - | 1915.7               | -41                 | 0.3       | 8      |
| n78                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | E-UTRA Band 1, 2, 3, 5, 7, 8, 11, 18, 19, 20, 21, 25, 26, 28, 32, 34, 39, 40, 41, 65, 66, 74, 75, 76<br>NR Band n100, n101                                             | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | NR Band n104                                                                                                                                                           | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Frequency range                                                                                                                                                        | 1884.5                | - | 1915.7               | -41                 | 0.3       | 8      |
| n79                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 21, 28, 34, 39, 40, 41, 42, 65, 74                                                                                              | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Frequency range                                                                                                                                                        | 1884.5                | - | 1915.7               | -41                 | 0.3       | 8      |
| n85                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | E-UTRA Band 2, 5, 13, 14, 17, 24, 25, 26, 27, 30, 41, 53, 70, 71, 74, 103                                                                                              | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | E-UTRA Band 4, 48, 50, 51, 66<br>NR Band n77, n78                                                                                                                      | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | E-UTRA Band 12, 85                                                                                                                                                     | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 15     |
| n95                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | E-UTRA Band 1, 3, 5, 8, 28, 39, 40, 41<br>NR Band n78, n79                                                                                                             | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 5      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | NR Band n77                                                                                                                                                            | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Frequency range                                                                                                                                                        | 1884.5                | - | 1915.7               | -41                 | 0.3       | 8      |
| n100                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | E-UTRA Band 1, 3, 8, 20, 28, 31, 32, 33, 34, 38, 40, 43, 50, 51, 52, 65, 67, 68, 69, 72, 74, 75, 76<br>NR Band n101                                                    | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | E-UTRA Band 7, 22, 42<br>NR Band n77, n78                                                                                                                              | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Frequency range                                                                                                                                                        | 758                   | - | 788                  | -50                 | 1         |        |
| n101                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | E-UTRA Band 1, 3, 8, 20, 22, 28, 31, 32, 34, 38, 40, 50, 51, 52, 65, 67, 68, 69, 72, 74, 75, 76<br>NR Band n100                                                        | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | E-UTRA Band 7, 42, 43<br>NR Band n77, n78                                                                                                                              | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Frequency range                                                                                                                                                        | 758                   | - | 788                  | -50                 | 1         |        |
| n104                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | E-UTRA Band 1, 3, 7, 8, 20                                                                                                                                             | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | NR Band n77, n78                                                                                                                                                       | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |        |
| NOTE 1: F <sub>DL_low</sub> and F <sub>DL_high</sub> refer to each frequency band specified in Table 5.2-1 in TS 38.101-1 or Table 5.5-1 in TS 36.101                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                        |                       |   |                      |                     |           |        |
| NOTE 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.5.3.1-2 are permitted for each assigned NR carrier used in the measurement due to 2nd, 3rd, 4th or 5th harmonic spurious emissions. Due to spreading of the harmonic emission the exception is also allowed for the first 1 MHz frequency range immediately outside the harmonic emission on both sides of the harmonic emission. This results in an overall exception interval centred at the |                                                                                                                                                                        |                       |   |                      |                     |           |        |

| NR Band | Spurious emission for UE co-existence                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                       |                     |           |      |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------------|-----------|------|
|         | Protected band                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Frequency range (MHz) | Maximum Level (dBm) | MBW (MHz) | NOTE |
|         | <p>harmonic emission of <math>(2 \text{ MHz} + N \times L_{\text{CRB}} \times R_{\text{Bsize}} \text{ kHz})</math>, where N is 2, 3, 4, 5 for the 2nd, 3rd, 4th or 5th harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval.</p> <p>NOTE 3: 15 kHz SCS is assumed when RB is mentioned in the note when channel bandwidth is less than or equal to 50 MHz, lowest SCS is assumed when channel bandwidth is larger than 50 MHz. The transmission bandwidth in terms of RB position and range is not limited to 15 kHz SCS and shall scale with SCS accordingly.</p> <p>NOTE 4: Void</p> <p>NOTE 5: For non-synchronised TDD operation to meet these requirements some restriction will be needed for either the operating band or protected band</p> <p>NOTE 6: N/A</p> <p>NOTE 7: Void</p> <p>NOTE 8: Applicable when co-existence with PHS system operating in 1884.5 - 1915.7 MHz.</p> <p>NOTE 9: Void</p> <p>NOTE 10: Void</p> <p>NOTE 11: Void</p> <p>NOTE 12: The emissions measurement shall be sufficiently power averaged to ensure a standard deviation &lt; 0.5 dB</p> <p>NOTE 13: Void</p> <p>NOTE 14: Void</p> <p>NOTE 15: These requirements also apply for the frequency ranges that are less than <math>F_{\text{OoB}}</math> (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.</p> <p>NOTE 16: Void</p> <p>NOTE 17: Void</p> <p>NOTE 18: Void</p> <p>NOTE 19: Applicable when the assigned NR carrier is confined within 718 MHz and 748 MHz and when the channel bandwidth used is 5 or 10 MHz.</p> <p>NOTE 20: Void</p> <p>NOTE 21: This requirement is applicable for any channel bandwidths up to 20MHz within the range 2500 - 2570 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2560.5 - 2562.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2552 - 2560 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.</p> <p>NOTE 22: This requirement is applicable for power class 3 UE for any channel bandwidths up to 20 MHz. For channel bandwidth within the range 2570 - 2615 MHz with the following restriction: for carriers of 15 MHz bandwidth when the carrier centre frequency is within the range 2605.5 - 2607.5 MHz and for carriers of 20 MHz bandwidth when the carrier centre frequency is within the range 2597 - 2605 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB. . For carriers overlapping the frequency range 2615 - 2620 MHz the requirement applies with the maximum output power configured to +19 dBm in the IE P-Max.</p> <p>NOTE 23: Void</p> <p>NOTE 24: As exceptions, measurements with a level up to the applicable requirement of -38 dBm/MHz is permitted for each assigned NR carrier used in the measurement due to 2nd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.3.1-1) for which the 2nd harmonic totally or partially overlaps the measurement bandwidth (MBW).</p> <p>NOTE 25: As exceptions, measurements with a level up to the applicable requirement of -36 dBm/MHz is permitted for each assigned NR carrier used in the measurement due to 3rd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.3.1-1) for which the 3rd harmonic totally or partially overlaps the measurement bandwidth (MBW).</p> <p>NOTE 26: For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band.</p> <p>NOTE 27: This requirement is applicable for power class 3 and channel bandwidths up to 20 MHz within the range 1920 - 1980 MHz with the following restriction: for carriers of 15 MHz bandwidth when the carrier centre frequency is within the range 1927.5 - 1929.5 MHz and for carriers of 20 MHz bandwidth when the carrier centre frequency is within the range 1930 - 1938 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.</p> <p>NOTE 28: Void</p> <p>NOTE 29: Void</p> <p>NOTE 30: Void</p> <p>NOTE 31: Void</p> <p>NOTE 32: Void</p> |                       |                     |           |      |



| NR Band                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Spurious emission for UE co-existence |                       |                     |           |      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|-----------------------|---------------------|-----------|------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Protected band                        | Frequency range (MHz) | Maximum Level (dBm) | MBW (MHz) | NOTE |
| <p>NOTE 33: This requirement is only applicable for carriers with bandwidth up to 20MHz and confined within 1885-1920 MHz (requirement for carriers with at least 1RB confined within 1880 - 1885 MHz is not specified). This requirement applies for an uplink transmission bandwidth less than or equal to 54 RB for carriers of 15 MHz bandwidth when carrier center frequency is within the range 1892.5 - 1894.5 MHz and for carriers of 20 MHz bandwidth when carrier center frequency is within the range 1895 - 1903 MHz. The above restriction is applicable to only power class 3 UEs.</p> <p>NOTE 34: This requirement is applicable for 5 and 10 MHz NR channel bandwidth allocated within 718-728 MHz. For carriers of 10 MHz bandwidth, this requirement applies for an uplink transmission bandwidth less than or equal to 30 RB with <math>RB_{start} &gt; 1</math> and <math>RB_{start} &lt; 48</math>.</p> <p>NOTE 35: This requirement is applicable in the case of a 10 MHz NR carrier confined within 703 MHz and 733 MHz, otherwise the requirement of -25 dBm with a measurement bandwidth of 8 MHz applies.</p> <p>NOTE 36: Void</p> <p>NOTE 37: Void</p> <p>NOTE 38: Void</p> <p>NOTE 39: Void</p> <p>NOTE 40: Void</p> <p>NOTE 41: Applicable for cases and when the lower edge of the assigned NR UL channel bandwidth frequency is greater than or equal to 1427 MHz + the channel BW assigned for 5 and 10 MHz bandwidth, and when the lower edge of the assigned NR UL channel bandwidth frequency is greater than or equal to 1440 MHz for 15 and 20 MHz bandwidth. This requirement shall be verified with UE transmission power configured as high as possible but no higher than 15 dBm.</p> <p>NOTE 42: Applicable when upper edge of the assigned NR UL channel bandwidth frequency is more than 1460 MHz and less than or equal to 1470 MHz for 5 MHz bandwidth, and when the upper edge of the assigned NR UL channel bandwidth frequency is more than 1460 MHz and less than or equal to 1465 MHz for 10 MHz bandwidth.</p> <p>NOTE 43: This requirement is applicable for UE which is operating in power class 3 and NR channel bandwidths up to 20MHz within frequency range 1920-1980 MHz.</p> <p>NOTE 44: As exceptions, for 90 and 100 MHz channel bandwidth, -40 dBm/MHz is applicable in the frequency range of 2496 – 2505 MHz.</p> <p>NOTE 45: Applicable when upper edge of the assigned NR UL channel bandwidth frequency is equal to or less than 1460 MHz.</p> <p>NOTE 46: Applicable for 5 MHz bandwidth and when the NR carrier is within 1447.9 – 1462.9 MHz.</p> <p>NOTE 47: This requirement is applicable for power class 3 and channel bandwidths up to 20MHz.</p> <p>NOTE 48: Applicable when contained within 2545 – 2575 MHz in Japan. Channel bandwidth shall be confined so that there is at least <math>BW_{Channel}</math> separation between 2535 MHz and lower <math>BW_{Channel}</math> edge in the current release. With this <math>BW_{Channel}</math> placement the requirement is covered by general SEM and the spurious emission limits.</p> |                                       |                       |                     |           |      |

NOTE: To simplify Table 6.5.3.2-1, E-UTRA band numbers are listed for bands which are specified only for E-UTRA operation or both E-UTRA and NR operation. NR band numbers are listed for bands which are specified only for NR operation.

### 6.5.3.3 Additional spurious emissions

These requirements are specified in terms of an additional spectrum emission requirement. Additional spurious emission requirements are signalled by the network to indicate that the UE shall meet an additional requirement for a specific deployment scenario as part of the cell handover/broadcast message.

#### 6.5.3.3.1 Requirement for network signalling value "NS\_04"

When "NS\_04" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.3.1-1. This requirement also applies for the frequency ranges that are less than  $F_{OOB}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

**Table 6.5.3.3.1-1: Additional requirements for "NS\_04"**

| Frequency range (MHz) | Channel bandwidth (MHz) / Spectrum emission limit (dBm) | Measurement bandwidth |
|-----------------------|---------------------------------------------------------|-----------------------|
|                       | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100 MHz             |                       |

|                        |     |                   |
|------------------------|-----|-------------------|
| $2495 \leq f < 2496$   | -13 | 1 % of Channel BW |
| $2490.5 \leq f < 2495$ | -13 | 1 MHz             |
| $0.009 < f < 2490.5$   | -25 | 1 MHz             |

#### 6.5.3.3.2 Requirement for network signalling value "NS\_17"

When "NS\_17" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.3.2-1. This requirement also applies for the frequency ranges that are less than  $F_{\text{OoB}}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

**Table 6.5.3.3.2-1: Additional requirements for "NS\_17"**

| Frequency range (MHz)                                                                                                                      | Channel bandwidth (MHz) / Spectrum emission limit (dBm) | Measurement bandwidth | NOTE |
|--------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|-----------------------|------|
|                                                                                                                                            | 5, 10                                                   |                       |      |
| $470 \leq f \leq 710$                                                                                                                      | -26.2                                                   | 6 MHz                 | 1    |
| NOTE 1: Applicable when the assigned NR carrier is confined within 718 MHz and 748 MHz and when the channel bandwidth used is 5 or 10 MHz. |                                                         |                       |      |

#### 6.5.3.3.3 Requirement for network signalling value "NS\_18"

When "NS\_18" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.3.3-1. This requirement also applies for the frequency ranges that are less than  $F_{\text{OoB}}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

**Table 6.5.3.3.3-1: Additional requirements for "NS\_18"**

| Frequency range (MHz) | Channel bandwidth (MHz) / Spectrum emission limit (dBm) | Measurement bandwidth |  |
|-----------------------|---------------------------------------------------------|-----------------------|--|
|                       | 5, 10, 15, 20, 25, 30                                   |                       |  |
| 692-698               | -26.2                                                   | 6 MHz                 |  |

#### 6.5.3.3.4 Requirement for network signalling values "NS\_05" and "NS\_05U"

When "NS\_05" or "NS\_05U" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.3.4-1. This requirement also applies for the frequency ranges that are less than  $F_{\text{OoB}}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

**Table 6.5.3.3.4-1: Additional requirements for "NS\_05" and "NS\_05U"**

| Frequency range (MHz)       | Channel bandwidth (MHz) / Spectrum emission limit (dBm) | Measurement bandwidth |  |
|-----------------------------|---------------------------------------------------------|-----------------------|--|
|                             | 5, 10, 15, 20                                           |                       |  |
| $1884.5 \leq f \leq 1915.7$ | -41                                                     | 300 kHz               |  |

#### 6.5.3.3.5 Requirement for network signalling values "NS\_43" and "NS\_43U"

When "NS\_43" or "NS\_43U" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.3.5-1. This requirement also applies for the frequency ranges that are less than  $F_{\text{OoB}}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

**Table 6.5.3.3.5-1: Additional requirements for "NS\_43" and "NS\_43U"**

| Frequency range (MHz) | Channel bandwidth (MHz) / Spectrum emission limit (dBm) | Measurement bandwidth |
|-----------------------|---------------------------------------------------------|-----------------------|
|-----------------------|---------------------------------------------------------|-----------------------|

|                                                                                                                                                        |           |       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------|
|                                                                                                                                                        | 5, 10, 15 |       |
| $860 \leq f \leq 890$                                                                                                                                  | -40       | 1 MHz |
| NOTE 1: Applicable for 5 MHz and 15 MHz channel BW confined between 900 MHz and 915 MHz and for 10 MHz channel BW confined between 905 MHz and 915 MHz |           |       |

#### 6.5.3.3.6 Requirement for network signalling value "NS\_37"

When "NS\_37" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.3.6-1. This requirement also applies for the frequency ranges that are less than  $F_{\text{OoB}}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

**Table 6.5.3.3.6-1: Additional requirement for "NS\_37"**

| Frequency range (MHz)       | Channel bandwidth (MHz) / Spectrum emission limit (dBm) | Measurement bandwidth |
|-----------------------------|---------------------------------------------------------|-----------------------|
|                             | 5, 10, 15                                               |                       |
| $1475.9 \leq f \leq 1510.9$ | -35                                                     | 1 MHz                 |

#### 6.5.3.3.7 Requirement for network signalling value "NS\_38"

When "NS\_38" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.3.7-1. This requirement also applies for the frequency ranges that are less than  $F_{\text{OoB}}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

**Table 6.5.3.3.7-1: Additional requirements for NR channels assigned within 1430-1452MHz for "NS\_38"**

| Frequency range (MHz)                                                                                                           | Channel bandwidth (MHz) / Spectrum emission limit (dBm) | Measurement bandwidth |
|---------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|-----------------------|
|                                                                                                                                 | 5, 10, 15                                               |                       |
| $1400 \leq f \leq 1427$                                                                                                         | -32                                                     | 27 MHz                |
| NOTE 1: This requirement shall be verified with UE transmission power configured as high as possible but no higher than 15 dBm. |                                                         |                       |

#### 6.5.3.3.8 Requirement for network signalling value "NS\_39"

When "NS\_39" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.3.8-1. This requirement also applies for the frequency ranges that are less than  $F_{\text{OoB}}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

**Table 6.5.3.3.8-1: Additional requirements for "NS\_39"**

| Frequency range (MHz)   | Channel bandwidth (MHz) / Spectrum emission limit (dBm) | Measurement bandwidth |
|-------------------------|---------------------------------------------------------|-----------------------|
|                         | 5, 10, 15, 20                                           |                       |
| $1475 \leq f \leq 1488$ | -28                                                     | 1 MHz                 |

#### 6.5.3.3.9 Requirement for network signalling value "NS\_40"

When "NS\_40" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.3.9-1. This requirement also applies for the frequency ranges that are less than  $F_{\text{OoB}}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

**Table 6.5.3.3.9-1: Additional requirements for NR channels assigned within 1427-1432MHz for "NS\_40"**

| Frequency range (MHz)                                                                                                           | Channel bandwidth (MHz) / Spectrum emission limit (dBm) | Measurement bandwidth |
|---------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|-----------------------|
|                                                                                                                                 | 5                                                       |                       |
| $1400 \leq f \leq 1427$                                                                                                         | -32                                                     | 27 MHz                |
| NOTE 1: This requirement shall be verified with UE transmission power configured as high as possible but no higher than 15 dBm. |                                                         |                       |

**6.5.3.3.10 Requirement for network signalling value "NS\_41"**

When "NS\_41" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.3.10-1. This requirement also applies for the frequency ranges that are less than  $F_{OoB}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

**Table 6.5.3.3.10-1: Additional requirements for NR channels assigned within 1432-1517 MHz for "NS\_41"**

| Frequency range (MHz)                                                                                                           | Channel bandwidth (MHz) / Spectrum emission limit (dBm) | Measurement bandwidth |
|---------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|-----------------------|
|                                                                                                                                 | 5, 10, 15, 20, 40, 50, 60                               |                       |
| $1400 \leq f \leq 1427$                                                                                                         | -32                                                     | 27 MHz                |
| NOTE 1: This requirement shall be verified with UE transmission power configured as high as possible but no higher than 15 dBm. |                                                         |                       |

**6.5.3.3.11 Requirement for network signalling value "NS\_42"**

When "NS\_42" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.3.11-1. This requirement also applies for the frequency ranges that are less than  $F_{OoB}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

**Table 6.5.3.3.11-1: Additional requirements for NR channels assigned within 1432-1517 MHz for "NS\_42"**

| Frequency range (MHz)   | Channel bandwidth (MHz) / Spectrum emission limit (dBm) | Measurement bandwidth |
|-------------------------|---------------------------------------------------------|-----------------------|
|                         | 5, 10, 15, 20, 40, 50, 60 MHz                           |                       |
| $1518 \leq f \leq 1520$ | -0.8                                                    | 1 MHz                 |
| $1520 < f \leq 1559$    | -30                                                     | 1 MHz                 |

**6.5.3.3.12 Requirement for network signalling value "NS\_21"**

When "NS\_21" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.3.12-1. These requirements also apply for the frequency ranges that are less than  $F_{OoB}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

**Table 6.5.3.3.12-1: Additional requirements for "NS\_21"**

| Frequency range (MHz) | Channel bandwidth (MHz) / Spectrum emission limit (dBm) | Measurement bandwidth |
|-----------------------|---------------------------------------------------------|-----------------------|
|                       | 5, 10                                                   |                       |
| $2200 \leq f < 2288$  | -40                                                     | 1 MHz                 |
| $2288 \leq f < 2292$  | -37                                                     | 1 MHz                 |
| $2292 \leq f < 2296$  | -31                                                     | 1 MHz                 |
| $2296 \leq f < 2300$  | -25                                                     | 1 MHz                 |
| $2320 \leq f < 2324$  | -25                                                     | 1 MHz                 |

|                         |     |       |
|-------------------------|-----|-------|
| $2324 \leq f < 2328$    | -31 | 1 MHz |
| $2328 \leq f < 2332$    | -37 | 1 MHz |
| $2332 \leq f \leq 2395$ | -40 | 1 MHz |

#### 6.5.3.3.13 Requirement for network signalling value "NS\_24"

When "NS\_24" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.3.13-1. This requirement also applies for the frequency ranges that are less than  $F_{\text{OoB}}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

**Table 6.5.3.3.13-1: Additional requirements for "NS\_24"**

| Frequency range (MHz)                                                                                                                                                                                 | Channel bandwidth (MHz) / Spectrum emission limit (dBm) | Measurement bandwidth |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|-----------------------|
|                                                                                                                                                                                                       | 5 MHz, 10 MHz, 15 MHz, 20 MHz                           |                       |
| $2010 \leq f \leq 2025$                                                                                                                                                                               | -50                                                     | 1 MHz                 |
| NOTE 1: This requirement applies at a frequency offset equal or larger than 5 MHz from the upper edge of the channel bandwidth, whenever these frequencies overlap with the specified frequency band. |                                                         |                       |

#### 6.5.3.3.14 Requirement for network signalling value "NS\_27"

When "NS\_27" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.3.14-1. This requirement also applies for the frequency ranges that are less than  $F_{\text{OoB}}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

**Table 6.5.3.3.14-1: Additional requirements for "NS\_27"**

| Frequency range (MHz) | Channel bandwidth (MHz) / Spectrum emission limit (dBm) | Measurement bandwidth |
|-----------------------|---------------------------------------------------------|-----------------------|
|                       | 5, 10, 15, 20, 30, 40                                   |                       |
| 9 kHz – 3530 MHz      | -40                                                     | 1 MHz                 |
| 3530 MHz – 3540 MHz   | -25                                                     |                       |
| 3710 MHz – 3720 MHz   | -25                                                     |                       |
| 3720 MHz – 12.75 GHz  | -40                                                     |                       |

#### 6.5.3.3.15 Requirement for network signalling value "NS\_47"

When "NS\_47" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.3.15-1. This requirement also applies for the frequency ranges that are less than  $F_{\text{OoB}}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

**Table 6.5.3.3.15-1: Additional requirements for NR channels assigned within 2545 - 2575 MHz for "NS\_47"**

| Frequency range (MHz)   | Channel bandwidth (MHz) / Spectrum emission limit (dBm) | Measurement bandwidth |
|-------------------------|---------------------------------------------------------|-----------------------|
|                         | 30                                                      |                       |
| $2530 \leq f \leq 2535$ | -25                                                     | 1 MHz                 |
| $2505 \leq f \leq 2530$ | -30                                                     | 1 MHz                 |

#### 6.5.3.3.16 Requirement for network signalling value "NS\_50"

When "NS\_50" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.3.16-1. This requirement also applies for the frequency ranges that are less than  $F_{\text{OoB}}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

**Table 6.5.3.3.16-1: Additional requirements for "NS\_50"**

| Protected band                                                                                                                                                                                      | Frequency range (MHz) |   |      | Maximum Level (dBm) | MBW (MHz) | NOTE    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---|------|---------------------|-----------|---------|
| Frequency range                                                                                                                                                                                     | 1805                  | - | 1855 | -40                 | 1         | 1       |
| Frequency range                                                                                                                                                                                     | 1855                  | - | 1880 | -15.5               | 5         | 1, 2, 3 |
| NOTE 1: This requirement is applicable for carriers with aggregated channel bandwidths confined in 1885-1920 MHz for $\leq 30$ MHz channel BWs and confined in 1880-1920 MHz for 40 MHz channel BW. |                       |   |      |                     |           |         |
| NOTE 2: The requirement also applies for the frequency ranges that are less than $F_{OoB}$ (MHz) in Table 6.5.3.1-1 and Table 6.5A.3.1-1 from the edge of the channel bandwidth.                    |                       |   |      |                     |           |         |
| NOTE 3: For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band.                                                   |                       |   |      |                     |           |         |

#### 6.5.3.3.17 Requirement for network signalling value "NS\_12"

When "NS\_12" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.3.17-1. This requirement also applies for the frequency ranges that are less than  $F_{OoB}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

**Table 6.5.3.3.17-1: Additional requirements "NS\_12"**

| Frequency range (MHz)                                                                                             | Channel bandwidth / Spectrum emission limit (dBm) | Measurement bandwidth |
|-------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|-----------------------|
|                                                                                                                   | 5 MHz, 10 MHz                                     |                       |
| $806 \leq f \leq 813.5$                                                                                           | -42                                               | 6.25 kHz              |
| NOTE 1: The requirement applies for NR carriers with lower channel edge at or above 814 MHz.                      |                                                   |                       |
| NOTE 2: The emissions measurement shall be sufficiently power averaged to ensure a standard deviation $< 0.5$ dB. |                                                   |                       |

#### 6.5.3.3.18 Requirement for network signalling value "NS\_13"

When "NS\_13" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.3.18-1. This requirement also applies for the frequency ranges that are less than  $F_{OoB}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

**Table 6.5.3.3.18-1: Additional requirements "NS\_13"**

| Frequency range (MHz)                                                                                             | Channel bandwidth / Spectrum emission limit (dBm) | Measurement bandwidth |
|-------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|-----------------------|
|                                                                                                                   | 5 MHz                                             |                       |
| $806 \leq f \leq 816$                                                                                             | -42                                               | 6.25 kHz              |
| NOTE 1: The requirement applies for NR carriers with lower channel edge at or above 817 MHz.                      |                                                   |                       |
| NOTE 2: The emissions measurement shall be sufficiently power averaged to ensure a standard deviation $< 0.5$ dB. |                                                   |                       |

#### 6.5.3.3.19 Requirement for network signalling value "NS\_14"

When "NS\_14" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.3.19-1. This requirement also applies for the frequency ranges that are less than  $F_{OoB}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

**Table 6.5.3.3.19-1: Additional requirements "NS\_14"**

| Frequency range (MHz) | Channel bandwidth / Spectrum emission limit (dBm) | Measurement bandwidth |
|-----------------------|---------------------------------------------------|-----------------------|
|                       | 10 MHz, 15 MHz, 20 MHz                            |                       |
| $806 \leq f \leq 816$ | -42                                               | 6.25 kHz              |

NOTE 1: The requirement applies for NR carriers with lower channel edge at or above 824 MHz

NOTE 2: The emissions measurement shall be sufficiently power averaged to ensure a standard deviation < 0.5 dB.

### 6.5.3.3.20 Requirement for network signalling value "NS\_15"

When "NS\_15" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.3.20-1. This requirement also applies for the frequency ranges that are less than  $F_{\text{OoB}}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

**Table 6.5.3.3.20-1: Additional requirements "NS\_15"**

| Frequency range (MHz)                                                                                           | Channel bandwidth / Spectrum emission limit (dBm) | Measurement bandwidth |
|-----------------------------------------------------------------------------------------------------------------|---------------------------------------------------|-----------------------|
|                                                                                                                 | 5 MHz, 10 MHz, 15 MHz, 20 MHz                     |                       |
| $851 \leq f \leq 859$                                                                                           | -53                                               | 6.25 kHz              |
| NOTE 1: The emissions measurement shall be sufficiently power averaged to ensure a standard deviation < 0.5 dB. |                                                   |                       |

### 6.5.3.3.21 Requirement for network signalling value "NS\_45"

When "NS\_45" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.3.21-1. This requirement also applies for the frequency ranges that are less than  $F_{\text{OoB}}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

**Table 6.5.3.3.21-1: Additional requirements "NS\_45"**

| Frequency range (MHz)                                                                          | Channel bandwidth / Spectrum emission limit (dBm) |        | Measurement bandwidth   |
|------------------------------------------------------------------------------------------------|---------------------------------------------------|--------|-------------------------|
|                                                                                                | 5 MHz                                             | 10 MHz |                         |
| $0.009 < f \leq 2473.5$                                                                        | -25                                               | -25    | 1 MHz                   |
| $2473.5 < f \leq 2477.5$                                                                       | -25                                               | -13    | 1 MHz                   |
| $2477.5 < f \leq 2478.5$                                                                       | -13                                               | -13    | 1 MHz                   |
| $2478.5 < f \leq 2483.5$                                                                       | -10                                               | -10    | 1 MHz                   |
| $2495 \leq f < 2496$                                                                           | -13                                               | -13    | 1% of Channel Bandwidth |
| $2496 \leq f < 2501$                                                                           | -13                                               | -13    | 1 MHz                   |
| $2501 < f \leq 2505$                                                                           | -25                                               | -13    | 1 MHz                   |
| $2505 \leq f \leq 5^{\text{th}}$ harmonic of the upper frequency edge of the UL operating band | -25                                               | -25    | 1 MHz                   |

### 6.5.3.3.22 Requirement for network signalling values "NS\_48" and "NS\_51"

When "NS\_48" or "NS\_51" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.3.22-1. This requirement also applies for the frequency ranges that are less than  $F_{\text{OoB}}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

**Table 6.5.3.3.22-1: Additional requirements for "NS\_48" and "NS\_51"**

| Protected band                                                                                                                                    | Frequency range (MHz) |   |                       | Maximum Level (dBm) | MBW (MHz) | NOTE |
|---------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---|-----------------------|---------------------|-----------|------|
| E-UTRA band 34 – NR band n34                                                                                                                      | $F_{\text{DL\_low}}$  | - | $F_{\text{DL\_high}}$ | -50                 | 1         |      |
| Frequency range                                                                                                                                   | 1900                  | - | 1915                  | -15.5               | 5         | 1    |
| Frequency range                                                                                                                                   | 1915                  | - | 1920                  | +1.6                | 5         | 1    |
| NOTE 1: For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band. |                       |   |                       |                     |           |      |

### 6.5.3.3.23 Requirement for network signalling value "NS\_49"

When "NS\_49" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.3.23-1. This requirement also applies for the frequency ranges that are less than  $F_{OOB}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

**Table 6.5.3.3.23-1: Additional requirements for "NS\_49"**

| Protected band                                                                                                                                    | Frequency range (MHz) |   |                | Maximum Level (dBm) | MBW (MHz) | NOTE |
|---------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---|----------------|---------------------|-----------|------|
| E-UTRA band 34 - NR band n34                                                                                                                      | $F_{DL\_low}$         | - | $F_{DL\_high}$ | -50                 | 1         |      |
| Frequency range                                                                                                                                   | 1880                  | - | 1895           | -40                 | 1         |      |
| Frequency range                                                                                                                                   | 1895                  |   | 1915           | -15.5               | 5         | 1    |
| Frequency range                                                                                                                                   | 1915                  | - | 1920           | 1.6                 | 5         | 1    |
| NOTE 1: For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band. |                       |   |                |                     |           |      |

### 6.5.3.3.24 Requirement for network signalling value "NS\_44"

When "NS\_44" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.3.24-1. This requirement also applies for the frequency ranges that are less than  $F_{OOB}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

**Table 6.5.3.3.24-1: Additional requirements for "NS\_44"**

| Protected band                                                                                                                                    | Frequency range (MHz) |   |      | Maximum Level (dBm) | MBW (MHz) | NOTE |
|---------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---|------|---------------------|-----------|------|
| Frequency range                                                                                                                                   | 2620                  | - | 2645 | -15.5               | 5         | 1, 2 |
| Frequency range                                                                                                                                   | 2645                  | - | 2690 | -40                 | 1         | 1    |
| NOTE 1: This requirement is applicable for carriers confined in 2570-2615 MHz.                                                                    |                       |   |      |                     |           |      |
| NOTE 2: For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band. |                       |   |      |                     |           |      |

### 6.5.3.3.25 Requirement for network signalling value "NS\_46"

When "NS\_46" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.3.25-1. This requirement also applies for the frequency ranges that are less than  $F_{OOB}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

**Table 6.5.3.3.25-1: Additional requirements for "NS\_46"**

| Protected band                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Frequency range (MHz) |   |      | Maximum Level (dBm) | MBW (MHz) | NOTE |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---|------|---------------------|-----------|------|
| Frequency range                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 2570                  | - | 2575 | +1.6                | 5         | 1, 2 |
| Frequency range                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 2575                  | - | 2595 | -15.5               | 5         | 1, 2 |
| Frequency range                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 2595                  | - | 2620 | -40                 | 1         | 1    |
| NOTE 1: This requirement is applicable for all carriers confined in 2500-2570 MHz. Sepcial restrictions apply for channel bandwidths up to 20MHz: For carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2560.5 - 2562.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2552 - 2560 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB with the minimum supported SCS of 15KHz. |                       |   |      |                     |           |      |
| NOTE 2: For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band.                                                                                                                                                                                                                                                                                                                                                            |                       |   |      |                     |           |      |

### 6.5.3.3.26 Requirement for network signalling value "NS\_07"

When "NS\_07" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.3.26-1. This requirement also applies for the frequency ranges that are less than  $F_{OOB}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.



**Table 6.5.3.3.26-1: Additional requirements for "NS\_07"**

| Frequency range (MHz) | Channel bandwidth / Spectrum emission limit (dBm)                                                              | Measurement bandwidth |
|-----------------------|----------------------------------------------------------------------------------------------------------------|-----------------------|
|                       | 5 MHz, 10 MHz                                                                                                  |                       |
| 769 ≤ f ≤ 775         | -57                                                                                                            | 6.25 kHz              |
| NOTE:                 | The emissions measurement shall be sufficiently power averaged to ensure standard standard deviation < 0.5 dB. |                       |

#### 6.5.3.3.27 Requirement for network signalling value "NS\_56"

When "NS\_56" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.3.27-1. This requirement also applies for the frequency ranges that are less than  $F_{\text{OoB}}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

**Table 6.5.3.3.27-1: Additional requirements for "NS\_56"**

| Frequency range (MHz)                                                                                   | Channel bandwidth / Spectrum emission limit <sup>1</sup> (dBm) | Measurement bandwidth | NOTE                                                         |
|---------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|-----------------------|--------------------------------------------------------------|
|                                                                                                         | 5 MHz, 10MHz                                                   |                       |                                                              |
| 1541 ≤ f ≤ 1559                                                                                         | -102                                                           | 2kHz                  | Averaged over any 2 millisecond active transmission interval |
| 1559≤ f ≤ 1608                                                                                          | -85                                                            | 700Hz                 |                                                              |
| 1608≤ f ≤ 1610                                                                                          | -85 +5/2 (f-1608)                                              | 700Hz                 |                                                              |
| 1610≤ f ≤ 1625                                                                                          | -80+ 66/15 (f-1610)                                            | 700Hz                 |                                                              |
| 1541 ≤ f ≤ 1608                                                                                         | -75                                                            | 1MHz                  | Averaged over any 2 millisecond active transmission interval |
| 1608≤ f ≤ 1610                                                                                          | -75 + 5/2 (f-1608)                                             | 1MHz                  |                                                              |
| 1610≤ f ≤ 1627.5                                                                                        | -70+ 57/17.5 (f-1610)                                          | 1MHz                  |                                                              |
| 1627.5                                                                                                  | -37                                                            | 4kHz                  |                                                              |
| 1638.5 ≤f ≤ 1645.5                                                                                      | -28                                                            | 4kHz                  |                                                              |
| 1657.5 ≤f ≤ 1660.5                                                                                      | -28                                                            | 4kHz                  |                                                              |
| NOTE 1: The EIRP requirement in regulation is converted to conducted requirement using a 0 dBi antenna. |                                                                |                       |                                                              |

## 6.5.4 Transmit intermodulation

The transmit intermodulation performance is a measure of the capability of the transmitter to inhibit the generation of signals in its non linear elements caused by presence of the wanted signal and an interfering signal reaching the transmitter via the antenna.

UE transmit intermodulation is defined by the ratio of the mean power of the wanted signal to the mean power of the intermodulation product when an interfering CW signal is added at a level below the wanted signal at each transmitter antenna port with the other antenna port(s) if any terminated. Both the wanted signal power and the intermodulation product power are measured through NR rectangular filter with measurement bandwidth shown in Table 6.5.4-1.

The requirement of transmit intermodulation is specified in Table 6.5.4-1.

**Table 6.5.4-1: Transmit Intermodulation**

| Wanted signal channel bandwidth                          | $BW_{\text{Channel}}$                                                                                                         |                               |
|----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| Interference signal frequency offset from channel center | $BW_{\text{Channel}}$                                                                                                         | $2 \cdot BW_{\text{Channel}}$ |
| Interference CW signal level                             | -40 dBc                                                                                                                       |                               |
| Intermodulation product                                  | < -29 dBc                                                                                                                     | < -35 dBc                     |
| Measurement bandwidth                                    | The maximum transmission bandwidth configuration among the different SCS's for the channel BW as defined in Table 6.5.2.4.1-1 |                               |

|                                        |                                                         |                                                                 |
|----------------------------------------|---------------------------------------------------------|-----------------------------------------------------------------|
| Measurement offset from channel center | $BW_{\text{Channel}}$ and $2 \cdot BW_{\text{Channel}}$ | $2 \cdot BW_{\text{Channel}}$ and $4 \cdot BW_{\text{Channel}}$ |
|----------------------------------------|---------------------------------------------------------|-----------------------------------------------------------------|

## 6.5A Output RF spectrum emissions for CA

### 6.5A.0 General

For inter-band carrier aggregation with one uplink carrier assigned to one NR band, the output RF spectrum emissions requirements in clause 6.5 apply.

### 6.5A.1 Occupied bandwidth for CA

#### 6.5A.1.1 Void

#### 6.5A.1.1a Occupied bandwidth for Intra-band contiguous CA

For intra-band contiguous carrier aggregation the occupied bandwidth is a measure of the bandwidth containing 99 % of the total integrated power of the transmitted spectrum. The occupied bandwidth shall be less than the aggregated channel bandwidth defined in clause 5.3A.3.

#### 6.5A.1.2 Occupied bandwidth for Intra-band non-contiguous CA

For intra-band non-contiguous carrier aggregation, the OBW requirement is met when the ratio of the transmitted power in all sub-blocks of the uplink CA configuration to the total integrated power of the transmitted spectrum is greater than 99%.

#### 6.5A.1.3 Occupied bandwidth for Inter-band CA

For inter-band carrier aggregation with two contiguous carriers assigned to one NR band, the occupied bandwidth requirements in subclause 6.5A.1.1a apply for that band.

For inter-band carrier aggregation with uplink assigned to two NR bands, the occupied bandwidth is defined per component carrier. Occupied bandwidth is the bandwidth containing 99 % of the total integrated mean power of the transmitted spectrum on assigned channel bandwidth on the component carrier. The occupied bandwidth shall be less than the channel bandwidth specified in Table 6.5.1-1.

### 6.5A.2 Out of band emission for CA

#### 6.5A.2.1 General

This clause contains requirements for out of band emissions for UE configured of carrier aggregation.

#### 6.5A.2.2 Spectrum emission mask

##### 6.5A.2.2.1 Spectrum emission mask for intra-band contiguous CA

For intra-band contiguous carrier aggregation the spectrum emission mask of the UE applies to frequencies ( $\Delta f_{\text{OOB}}$ ) starting from the  $\pm$  edge of the aggregated channel bandwidth. For intra-band contiguous carrier aggregation, the power of any UE emission shall not exceed the levels specified in Table 6.5A.2.2.1-1 for the specified channel bandwidth.

For power class 2 intra-band contiguous carrier aggregation, the spectrum emission mask is measured as the sum from both UE transmit antenna connectors when UE indicates support for *dualPA-Architecture* IE.

**Table 6.5A.2.2.1-1: General NR CA spectrum emission mask**

| $\Delta f_{\text{OOB}}$ | Spectrum emission limit(dBm) | MBW(MHz) |
|-------------------------|------------------------------|----------|
|-------------------------|------------------------------|----------|

| (MHz)                                                                     |     |                                                              |
|---------------------------------------------------------------------------|-----|--------------------------------------------------------------|
| $\pm 0 - 1$                                                               | -13 | $\text{Min}(0.01 \cdot \text{BW}_{\text{channel\_CA}}, 0.4)$ |
| $\pm 1 - 5$                                                               | -10 | 1MHz                                                         |
| $\pm 5 - \text{BW}_{\text{channel\_CA}}$                                  | -13 | 1MHz                                                         |
| $\pm \text{BW}_{\text{channel\_CA}} - \text{BW}_{\text{channel\_CA}} + 5$ | -25 | 1MHz                                                         |

#### 6.5A.2.2.2 Spectrum emission mask for intra-band non-contiguous CA

For intra-band non-contiguous carrier aggregation the spectrum emission mask requirement is defined as a composite spectrum emissions mask. Composite spectrum emission mask applies to frequencies up to  $\Delta f_{\text{OOB}}$  starting from the edges of the sub-blocks. Composite spectrum emission mask is defined as follows

- Composite spectrum emission mask is a combination of individual sub-block spectrum emissions masks
- In case the sub-block consist of one component carrier the sub-block general spectrum emission mask is defined in subclause 6.5.2.1
- If for some frequency sub-block spectrum emission masks overlap then spectrum emission mask allowing higher power spectral density applies for that frequency
- If for some frequency a sub-block spectrum emission mask overlaps with the sub-block bandwidth of another sub-block, then the emission mask does not apply for that frequency.

For intra-band non-contiguous carrier aggregation, the spectrum emission mask is measured as the sum from both UE transmit antenna connectors when UE indicates support for *dualPA-Architecture* IE.

#### 6.5A.2.2.3 Spectrum emission mask for Inter-band CA

For inter-band carrier aggregation with two contiguous carriers assigned to one NR band, the spectrum emission mask requirements in subclause 6.5A.2.2.1 apply for that band.

For inter-band carrier aggregation with two uplink non-contiguous carrier assigned to one NR band, the spectrum emission mask requirements in subclause 6.5A.2.2.2 apply for that band.

For inter-band carrier aggregation with uplink assigned to two NR bands, the spectrum emission mask of the UE is defined per component carrier while both component carriers are active and the requirements are specified in clauses 6.5.2.1 and 6.5.2.2. If for some frequency spectrum emission masks of component carriers overlap then spectrum emission mask allowing higher power spectral density applies for that frequency. If for some frequency a component carrier spectrum emission mask overlaps with the channel bandwidth of another component carrier, then the emission mask does not apply for that frequency.

For combinations of intra-band and inter-band carrier aggregation with three uplink component carriers (up to two contiguously aggregated carriers per operating band), the spectrum emission mask of the UE is defined per NR band while all component carriers are active. For the NR band supporting one component carrier the requirements in subclauses 6.5.2.1 and 6.5.2.2 apply. For the NR band supporting two contiguous component carriers the requirements specified in subclause 6.5A.2.2.1 apply. If for some frequency spectrum emission masks of single component carrier and two contiguous component carriers overlap then spectrum emission mask allowing higher power spectral density applies for that frequency. If for some frequency spectrum emission masks of single component carrier or two contiguous component carriers overlap then the emission mask does not apply for that frequency.

## 6.5.A.2.2.4 Void

## 6.5A.2.3 Additional spectrum emission mask for CA

## 6.5A.2.3.1 Additional spectrum emission mask for intra-band contiguous CA

## 6.5A.2.3.1.1 Requirements for network signalling value "CA\_NS\_04"

When "CA\_NS\_04" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5A.2.3.1.1-1. For power class 2 intra-band contiguous carrier aggregation, the additional spectrum emission mask is measured as the sum from both UE transmit antenna connectors when UE indicates support for *dualPA-Architecture* IE.

Table 6.5A.2.3.1.1-1: Additional requirements for "CA\_NS\_04"

| $\Delta f_{\text{OoB}}$<br>MHz                             | BWChannel_CA (MHz) / Spectrum emission limit (dBm) |        | Measurement<br>bandwidth |
|------------------------------------------------------------|----------------------------------------------------|--------|--------------------------|
|                                                            | $\leq 50$                                          | $> 50$ |                          |
| $\pm 0 - 1$                                                | -10                                                | -10    | 2 % of BWChannel_CA      |
| $\pm 1 - 5$                                                | -10                                                | -10    | 1 MHz                    |
| $\pm 5 - X$                                                | -13                                                | -13    | 1 MHz                    |
| $\pm X - (\text{BW}_{\text{Channel\_CA}} + 5 \text{ MHz})$ | -25                                                | -25    | 1 MHz                    |
| NOTE: X is aggregated bandwidth                            |                                                    |        |                          |

## 6.5A.2.3.1.2 Requirements for network signalling value "CA\_NS\_27"

When "CA\_NS\_27" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.2A.2.3.2.1-1.

Table 6.2A.2.3.2.1-1: Additional requirements for "CA\_NS\_27"

| Spectrum emission limit (dBm) / measurement bandwidth<br>for each aggregated channel bandwidth |                                               |                          |
|------------------------------------------------------------------------------------------------|-----------------------------------------------|--------------------------|
| $\Delta f_{\text{OoB}}$<br>MHz                                                                 | Aggregated channel bandwidth of<br>max 40 MHz | Measurement<br>bandwidth |
| $\pm 0 - 1$                                                                                    | -13                                           | 1 % of X                 |
| $\pm 1 - X$                                                                                    | -13                                           | 1 MHz                    |
| $< -X$ or $> X$                                                                                | -25                                           | 1 MHz                    |
| NOTE 1: X is the aggregated channel bandwidth                                                  |                                               |                          |
| NOTE 2: The requirements apply only at the frequency range from 3540 MHz to 3710 MHz.          |                                               |                          |

NOTE: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

## 6.5A.2.3.2 Additional spectrum emission mask for Intra-band non-contiguous CA

## 6.5A.2.3.2.1 Minimum requirement (network signalling value "CA\_NC\_NS\_04")

For intra-band non-cotiguous CA\_n41(2A), the additional SEM requirements in subclause 6.5.2.3.2 (indicated by NS\_04) applies in each uplink CC.

## 6.5A.2.3.3 Additional spectrum emission mask for Inter-band CA

## 6.5A.2.4 Adjacent channel leakage ratio

## 6.5A.2.4.1 NR ACLR

## 6.5A.2.4.1.1 NR ACLR for intra-band contiguous CA

For intra-band contiguous carrier aggregation the carrier aggregation the Adjacent Channel Leakage power Ratio is the ratio of the filtered mean power centred on the aggregated channel bandwidth to the filtered mean power centred on an adjacent aggregated channel bandwidth at nominal channel spacing. The assigned aggregated channel bandwidth power and adjacent aggregated channel bandwidth power are measured with rectangular filters with measurement bandwidths specified in Table 6.5A.2.4.1.1-1 for power class 3 and 6.5A.2.4.1.1-2 for power class 2. If the measured adjacent channel power is greater than  $-50\text{dBm}$  then the  $\text{NR}_{\text{ACLR}}$  shall be higher than the value specified in Table 6.5A.2.4.1.1-1 for power class 3 and 6.5A.2.4.1.1-2 for power class 2.

**Table 6.5A.2.4.1.1-1: General requirements for intra-band contiguous CA ACLR power class 3**

|                                                                                                                                                                                                                                                                     | ACLR / Measurement bandwidth                                                                  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| CA ACLR                                                                                                                                                                                                                                                             | 30 dB                                                                                         |
| CA Measurement bandwidth (NOTE 1)                                                                                                                                                                                                                                   | Nominal channel space+ $\text{MBW}_{\text{ACLR,low}}/2 + \text{MBW}_{\text{ACLR,high}}/2$     |
| Adjacent channel centre frequency offset (in MHz)                                                                                                                                                                                                                   | $+ \text{BW}_{\text{Channel\_CA}}$<br>/<br>$- \text{BW}_{\text{Channel\_CA}}$                 |
| Difference between ACLR MBW center and $F_{\text{c,low}}$                                                                                                                                                                                                           | $\text{MBW}_{\text{shift}} = (\text{MBW}_{\text{ACLR\_CA}} - \text{MBW}_{\text{ACLR,low}})/2$ |
| NOTE 1: $\text{MBW}_{\text{ACLR,low}}$ and $\text{MBW}_{\text{ACLR,high}}$ are the single-channel ACLR measurement bandwidths specified for channel bandwidths $\text{BW}_{\text{channel(low)}}$ and $\text{BW}_{\text{channel(high)}}$ in 6.5.2.4.1, respectively. |                                                                                               |

**Table 6.5A.2.4.1.1-2: General requirements for intra-band contiguous CA ACLR power class 2**

|                                                                                                                                                                                                                                                                     | ACLR / Measurement bandwidth                                                                  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| CA ACLR                                                                                                                                                                                                                                                             | 31 dB                                                                                         |
| CA Measurement bandwidth (NOTE 1)                                                                                                                                                                                                                                   | Nominal channel space+ $\text{MBW}_{\text{ACLR,low}}/2 + \text{MBW}_{\text{ACLR,high}}/2$     |
| Adjacent channel centre frequency offset (in MHz)                                                                                                                                                                                                                   | $+ \text{BW}_{\text{Channel\_CA}}$<br>/<br>$- \text{BW}_{\text{Channel\_CA}}$                 |
| Difference between ACLR MBW center and $F_{\text{c,low}}$                                                                                                                                                                                                           | $\text{MBW}_{\text{shift}} = (\text{MBW}_{\text{ACLR\_CA}} - \text{MBW}_{\text{ACLR,low}})/2$ |
| NOTE 1: $\text{MBW}_{\text{ACLR,low}}$ and $\text{MBW}_{\text{ACLR,high}}$ are the single-channel ACLR measurement bandwidths specified for channel bandwidths $\text{BW}_{\text{channel(low)}}$ and $\text{BW}_{\text{channel(high)}}$ in 6.5.2.4.1, respectively. |                                                                                               |

## 6.5A.2.4.1.2 NR ACLR for intra-band non-contiguous CA

For intra-band non-contiguous carrier aggregation, CA Adjacent Channel Leakage power Ratio( $\text{CA}_{\text{ACLR}}$ ) is the ratio of the sum of the filtered mean power centred on each assigned channel frequency to the filtered mean power centred on an adjacent NR channel frequency at nominal channel spacing. In case the sub-block gap bandwidth  $W_{\text{gap}}$  between two uplink sub-blocks is smaller than maximum of the two uplink sub-block bandwidths then no  $\text{CA}_{\text{ACLR}}$  requirement is set for the gap. Each assigned NR channel power and adjacent NR channel power are measured with rectangular filters with measurement bandwidths specified in Table 6.5A.2.4.1.2-1 for power class 3 and 6.5A.2.4.1.2-2 for power class 2. If the measured adjacent channel power is greater than  $-50\text{dBm}$  then the ACLR shall be higher than the value specified in Table 6.5A.2.4.1.2-1 for power class 3 and 6.5A.2.4.1.2-2 for power class 2.

**Table 6.5A.2.4.1.2-1: General requirements for intra-band non-contiguous CA ACLR power class 3**

|                                                                                                | ACLR / Measurement bandwidth              |
|------------------------------------------------------------------------------------------------|-------------------------------------------|
| CA ACLR                                                                                        | 30 dB                                     |
| CA Measurement bandwidth for each sub block (NOTE 1)                                           | $MBW_{ACLR}$                              |
| Adjacent channel centre frequency offset (in MHz)                                              | $+ BW_{Channel}$<br>/<br>$- BW_{Channel}$ |
| NOTE 1: $MBW_{ACLR}$ is the single-channel ACLR measurement bandwidths specified in 6.5.2.4.1. |                                           |

**Table 6.5A.2.4.1.2-2: General requirements for intra-band non-contiguous CA ACLR power class 2**

|                                                                                                | ACLR / Measurement bandwidth              |
|------------------------------------------------------------------------------------------------|-------------------------------------------|
| CA ACLR                                                                                        | 31 dB                                     |
| CA Measurement bandwidth for each sub block (NOTE 1)                                           | $MBW_{ACLR}$                              |
| Adjacent channel centre frequency offset (in MHz)                                              | $+ BW_{Channel}$<br>/<br>$- BW_{Channel}$ |
| NOTE 1: $MBW_{ACLR}$ is the single-channel ACLR measurement bandwidths specified in 6.5.2.4.1. |                                           |

**6.5A.2.4.1.3 NR ACLR for Inter-band CA**

For inter-band carrier aggregation with two contiguous carriers assigned to one NR band, the NR Adjacent Channel Leakage power Ratio (NRACLR) requirements in subclause 6.5A.2.4.1.1 apply for that band. For inter-band carrier aggregation with two uplink non-contiguous carrier assigned to one NR band, the NR Adjacent Channel Leakage power Ratio (NRACLR) requirements in subclause 6.5A.2.4.1.2 apply for that band.

For inter-band carrier aggregation with uplink assigned to two NR bands, the NR Adjacent Channel Leakage power Ratio (NRACLR) is defined per component carrier while both component carriers are active and the requirement is specified in clause 6.5.2.4.1.

For combinations of intra-band and inter-band carrier aggregation with three uplink component carriers (up to two contiguously aggregated carriers per operating band), the NR ACLR is defined as follows. For the NR band supporting one component carrier, the NR ACLR is the ratio of the filtered mean power centred on the assigned channel bandwidth of the component carrier to the filtered mean power centred on an adjacent channel frequency and the requirements in subclause 6.5.2.4.1 apply. For the NR band supporting two contiguous component carriers the NR ACLR is the ratio of the filtered mean power centred on the aggregated channel bandwidth to the filtered mean power centred on an adjacent(s) aggregated channel bandwidth at nominal channel spacing and the requirements of CA ACLR specified in subclause 6.5A.2.4.1.1 apply.

6.5A.2.4.1.4 Void

6.5A.2.4.2 UTRA ACLR

6.5A.2.4.2.1 Void

6.5A.2.4.2.2 Void

6.5A.2.4.2.3 UTRA ACLR for Inter-band CA

For inter-band carrier aggregation with uplink assigned to two NR bands, the UTRA Adjacent Channel Leakage power Ratio (UTRAACLR) is defined per component carrier while both component carrier are active and the requirement is specified in clause 6.5.2.4.2.

## 6.5A.3 Spurious emission for CA

### 6.5A.3.1 General spurious emissions

For inter-band carrier aggregation with uplink assigned to two NR bands, the spurious emission requirement Table 6.5.3.1-2 apply for the frequency ranges that are more than  $F_{\text{OOB}}$  as defined in Table 6.5.3.1-1 away from edges of the assigned channel bandwidth on a component carrier. If for some frequency a spurious emission requirement of individual component carrier overlaps with the spectrum emission mask or channel bandwidth of another component carrier then it does not apply.

**NOTE:** For inter-band carrier aggregation with uplink assigned to two NR bands the requirements in Table 6.5.3.1-2 could be verified by measuring spurious emissions at the specific frequencies where second and third order intermodulation products generated by the two transmitted carriers can occur; in that case, the requirements for remaining applicable frequencies in Table 6.5.3.1-2 would be considered to be verified by the measurements verifying the one uplink inter-band CA spurious emission requirement.

For intra-band contiguous carrier aggregation the spurious emission limits apply for the frequency ranges that are more than  $F_{\text{OOB}}$  (MHz) in Table 6.5A.3.1-1 from the edge of the aggregated channel bandwidth. For frequencies  $\Delta f_{\text{OOB}}$  greater than  $F_{\text{OOB}}$  as specified in Table 6.5A.3.1-1 the spurious emission requirements in Table 6.5.3.1-2 are applicable. For power class 2 intra-band contiguous carrier aggregation, the spurious emissions is measured as the sum from both UE transmit antenna connectors when UE indicates support for *dualPA-Architecture* IE.

**Table 6.5A.3.1-1: Boundary between out of band and spurious emission domain for intra-band contiguous carrier aggregation**

| Aggregated Channel bandwidth | OOB boundary $F_{\text{OOB}}$ (MHz) |
|------------------------------|-------------------------------------|
| $BW_{\text{Channel\_CA}}$    | $BW_{\text{Channel\_CA}} + 5$       |

For intra-band non-contiguous carrier aggregation transmission the spurious emission requirement is defined as a composite spurious emission requirement. Composite spurious emission requirement applies to frequency ranges that are more than  $F_{\text{OOB}}$  away from the edges of each carrier in the gap and out of the gap. Composite spurious emission requirement is defined as follows

- Composite spurious emission requirement is a combination of individual sub-block spurious emission requirements
- In case the sub-block consist of one component carrier the sub-block spurious emission requirement and  $F_{\text{OOB}}$  are defined in subclause 6.5.3.1
- If for some frequency an individual sub-block spurious emission requirement overlaps with the general spectrum emission mask or the sub-block bandwidth of another sub-block then it does not apply

For intra-band non-contiguous carrier aggregation, the spurious emissions is measured as the sum from both UE transmit antenna connectors when UE indicates support for *dualPA-Architecture* IE.

For combinations of intra-band and inter-band carrier aggregation with three uplink component carriers (up to two contiguously aggregated carriers per operating band), the spurious emission requirement is defined as follows. For the NR band supporting one component carrier the requirements in Table 6.5.3.1-2 apply for frequency ranges that are more than  $F_{\text{OOB}}$  (MHz) from the edges of assigned channel bandwidth as defined in Table 6.5.3.1-1. For the NR band supporting two contiguous component carriers the requirements in Table 6.5.3.1-2 apply for frequency ranges that are more than  $F_{\text{OOB}}$  (MHz) from the edges of assigned aggregated channel bandwidth as defined in Table 6.5A.3.1-1. If for some frequency a spurious emission requirement of a single component carrier or two contiguous component carriers overlap with the spurious emission requirement or channel bandwidth of another component carrier or two contiguously aggregated carriers then it does not apply.

## 6.5A.3.2 Spurious emissions for UE co-existence

### 6.5A.3.2.1 Spurious emissions for UE co-existence for intra-band contiguous CA

This clause specifies the requirements for the specified intra-band contiguous carrier aggregation configurations for coexistence with protected bands, the requirements in Table 6.5A.3.2.1-1 apply. For power class 2 intra-band contiguous carrier aggregation, the spurious emissions is measured as the sum from both UE transmit antenna connectors when UE indicates support for *dualPA-Architecture* IE.

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

**Table 6.5A.3.2.1-1: Requirements for uplink intra-band contiguous carrier aggregation**

| NR CA combination | Spurious emission                                                                                                                                                                            |                       |   |                      |                     |           | NOTE |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---|----------------------|---------------------|-----------|------|
|                   | Protected Band                                                                                                                                                                               | Frequency range (MHz) |   |                      | Maximum Level (dBm) | MBW (MHz) |      |
| CA_n5             | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 12, 13, 14, 17, 18, 19, 24, 25, 26, 28, 29, 30, 31, 34, 38, 40, 42, 43, 45, 48, 50, 51, 65, 66, 70, 71, 73, 74, 85, 103<br>NR Band n79                      | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |      |
|                   | E-UTRA Band 41, 52, 53<br>NR Band n77, n78                                                                                                                                                   | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 4    |
|                   | E-UTRA Band 11, 21                                                                                                                                                                           | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |      |
|                   | Frequency range                                                                                                                                                                              | 1884.5                | - | 1915.7               | -41                 | 0.3       | 5    |
| CA_n7             | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 12, 13, 14, 17, 20, 22, 26, 27, 28, 29, 30, 31, 32, 33, 34, 40, 42, 43, 50, 51, 52, 65, 66, 67, 68, 72, 74, 75, 76, 85, 103<br>NR Band n77, n78, n100, n101 | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |      |
| CA_n40            | E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 20, 21, 22, 26, 27, 28, 31, 32, 33, 34, 38, 39, 41, 42, 43, 44, 45, 50, 51, 52, 65, 67, 68, 69, 72, 74, 75, 76,<br>NR Band n77, n78, n100, n101       | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 7    |
|                   | NR Band n79                                                                                                                                                                                  | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2, 4 |
|                   | Frequency range                                                                                                                                                                              | 1884.5                | - | 1915.7               | -41                 | 0.3       | 5    |
| CA_n41            | E-UTRA Band 1, 2, 3, 4, 5, 8, 12, 13, 14, 17, 24, 25, 26, 27, 28, 29, 30, 34, 39, 42, 44, 45, 48, 50, 51, 52, 65, 66, 70, 71, 73, 74, 85, 103<br>NR Band n77, n78, n100                      | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |      |
|                   | NR Band n79                                                                                                                                                                                  | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2, 4 |
|                   | E-UTRA Band 9, 11, 18, 19, 21                                                                                                                                                                | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 6    |
|                   | E-UTRA Band 40                                                                                                                                                                               | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -40                 | 1         |      |
|                   | Frequency range                                                                                                                                                                              | 1884.5                | - | 1915.7               | -41                 | 0.3       | 5, 6 |
| CA_n48            | E-UTRA Band 2, 4, 5, 12, 13, 14, 17, 24, 25, 26, 29, 30, 41, 50, 51, 66, 70, 71, 74, 85, 103                                                                                                 | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |      |
| CA_n77            | E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 20, 21, 26, 28, 34, 39, 40, 41, 65, n100, n101                                                                                                        | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |      |
|                   | Frequency range                                                                                                                                                                              | 1884.5                | - | 1915.7               | -41                 | 0.3       | 5    |



|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                       |                     |   |                      |     |     |   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------|---|----------------------|-----|-----|---|
| CA_n78                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 20, 21, 26, 28, 34, 39, 40, 41, 65, n100, n101 | F <sub>DL_low</sub> | - | F <sub>DL_high</sub> | -50 | 1   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Frequency range                                                                       | 1884.5              | - | 1915.7               | -41 | 0.3 | 5 |
| CA_n79                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | E-UTRA Band 1, 3, 5, 8, 11, 18, 19, 21, 28, 34, 39, 40, 41, 42, 65                    | F <sub>DL_low</sub> | - | F <sub>DL_high</sub> | -50 | 1   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Frequency range                                                                       | 1884.5              | - | 1915.7               | -41 | 0.3 | 5 |
| <p>NOTE 1: Void</p> <p>NOTE 2: Void</p> <p>NOTE 3: Void</p> <p>NOTE 4: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.5.3.1-2 are permitted for each assigned NR carrier used in the measurement due to 2nd, 3rd, 4th or 5th harmonic spurious emissions. Due to spreading of the harmonic emission the exception is also allowed for the first 1 MHz frequency range immediately outside the harmonic emission on both sides of the harmonic emission. This results in an overall exception interval centred at the harmonic emission of (2 MHz + N × L<sub>CRB</sub> × R<sub>Bsize</sub> kHz), where N is 2, 3, 4, 5 for the 2nd, 3rd, 4th or 5th harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval.</p> <p>NOTE 5: Applicable when co-existence with PHS system operating in 1884.5 - 1915.7 MHz.</p> <p>NOTE 6: This requirement applies when the NR carrier is confined within 2545 – 2575 MHz or 2595 – 2645 MHz and the channel bandwidth is 10 or 20 MHz</p> <p>NOTE 7: As exceptions, for 90 and 100 MHz aggregated bandwidth, -40 dBm/MHz is applicable in the frequency range of 2496 – 2505 MHz.</p> |                                                                                       |                     |   |                      |     |     |   |

### 6.5A.3.2.2 Spurious emissions for UE co-existence for intra-band non-contiguous CA

This clause specifies the requirements for the specified intra-band non-contiguous carrier aggregation configurations for coexistence with protected bands, the requirements in Table 6.5A.3.2.2-1 apply. For intra-band non-contiguous carrier aggregation, the spurious emissions is measured as the sum from both UE transmit antenna connectors when UE indicates support for *dualPA-Architecture* IE.

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

**Table 6.5A.3.2.2-1: Requirements for uplink intra-band non-contiguous carrier aggregation**

| NR CA combination                                                                                                                                                                                                     | Spurious emission                                                                                                                                                           |                       |   |                      |                     |           | NOTE |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---|----------------------|---------------------|-----------|------|
|                                                                                                                                                                                                                       | Protected Band                                                                                                                                                              | Frequency range (MHz) |   |                      | Maximum Level (dBm) | MBW (MHz) |      |
| CA_n41                                                                                                                                                                                                                | E-UTRA Band 1, 2, 3, 4, 5, 8, 10, 12, 13, 14, 17, 24, 25, 26, 27, 28, 29, 30, 34, 39, 42, 44, 45, 48, 50, 51, 52, 65, 66, 70, 71, 73, 74, 85, 103<br>NR Band n77, n78, n100 | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |      |
|                                                                                                                                                                                                                       | NR Band n79                                                                                                                                                                 | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 1, 2 |
|                                                                                                                                                                                                                       | E-UTRA Band 40                                                                                                                                                              | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -40                 | 1         |      |
|                                                                                                                                                                                                                       | E-UTRA Band 9, 11, 18, 19, 21                                                                                                                                               | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2    |
| CA_n77                                                                                                                                                                                                                | E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 20, 21, 26, 28, 34, 39, 40, 41, 65<br>NR Band n100, n101                                                                             | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |      |
| CA_n78                                                                                                                                                                                                                | E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 20, 21, 26, 28, 34, 39, 40, 41, 65, n101                                                                                             | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |      |
| NOTE 1: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.5.3.1-2 are permitted for each assigned NR carrier used in the measurement due to 2nd, 3rd, 4th or 5th harmonic |                                                                                                                                                                             |                       |   |                      |                     |           |      |

spurious emissions. Due to spreading of the harmonic emission the exception is also allowed for the first 1 MHz frequency range immediately outside the harmonic emission on both sides of the harmonic emission. This results in an overall exception interval centred at the harmonic emission of  $(2 \text{ MHz} + N \times L_{\text{CRB}} \times R_{\text{Bsize}} \text{ kHz})$ , where N is 2, 3, 4, 5 for the 2nd, 3rd, 4th or 5th harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval.

NOTE 2: This requirement applies when the NR carrier is confined within 2545 – 2575 MHz or 2595 – 2645 MHz and the channel bandwidth is 10 or 20 MHz

### 6.5A.3.2.3 Spurious emissions for UE co-existence for Inter-band CA

This clause specifies the additional requirements for inter-band uplink carrier aggregation configurations with the single CC uplink assigned to two NR bands for coexistence with protected bands for the specified uplink carrier aggregation configurations in Table 6.5A.3.2.3-1. The intersection of the requirements for the individual bands specified in clause 6.5.3.2 shall also apply for the specified uplink carrier aggregation configurations. Intersection of a requirement means that both UL constituent bands have the same protected band requirement specified and if one or both protected bands have note(s) associated those note(s) also apply.

For inter-band carrier aggregation with two contiguous carriers assigned to one NR band, the requirements in subclause 6.5A.3.2.1 apply for that band.

For inter-band carrier aggregation with two uplink non-contiguous carrier assigned to one NR band, the spurious emissions for UE co-existence requirements in subclause 6.5A.3.2.2 apply for that band.

For inter-band carrier aggregation with the uplink assigned to two NR bands, the requirements in Table 6.5A.3.2.3-1 apply on each component carrier with all component carriers are active.

NOTE: For inter-band carrier aggregation with uplink assigned to two NR bands the requirements in Table 6.5A.3.2.3-1 could be verified by measuring spurious emissions at the specific frequencies where second and third order intermodulation products generated by the two transmitted carriers can occur; in that case, the requirements for remaining applicable frequencies in Table 6.5A.3.2.3-1 and in clause 6.5.3.2 would be considered to be verified by the measurements verifying the one uplink inter-band CA UE to UE co-existence requirements.

**Table 6.5A.3.2.3-1: Requirements for uplink inter-band carrier aggregation (two bands)**

| NR CA combination | Spurious emission |                       |   |        |                     |           |       |
|-------------------|-------------------|-----------------------|---|--------|---------------------|-----------|-------|
|                   | Protected Band    | Frequency range (MHz) |   |        | Maximum Level (dBm) | MBW (MHz) | NOTE  |
| CA_n1-n18         | Frequency range   | 758                   | - | 799    | -50                 | 1         |       |
|                   | Frequency range   | 799                   | - | 803    | -40                 | 1         | 4     |
|                   | Frequency range   | 860                   | - | 890    | -40                 | 1         |       |
|                   | Frequency range   | 945                   | - | 960    | -50                 | 1         |       |
|                   | Frequency range   | 2545                  | - | 2575   | -50                 | 1         |       |
|                   | Frequency range   | 2595                  | - | 2645   | -50                 | 1         |       |
| CA_n1-n20         | Frequency range   | 758                   | - | 788    | -50                 | 1         |       |
| CA_n1-n28         | Frequency range   | 470                   | - | 694    | -42                 | 8         | 4, 14 |
|                   | Frequency range   | 470                   | - | 710    | -26.2               | 6         | 15    |
|                   | Frequency range   | 758                   | - | 773    | -30                 | 1         | 4     |
|                   | Frequency range   | 773                   | - | 803    | -50                 | 1         |       |
|                   | Frequency range   | 662                   | - | 694    | -26.2               | 6         | 4     |
| CA_n1-n40         | Frequency range   | 1884.5                | - | 1915.7 | -41                 | 0.3       | 3     |
| CA_n1-n74         | Frequency range   | 1884.5                | - | 1915.7 | -41                 | 0.3       | 3     |
|                   | Frequency range   | 1400                  | - | 1427   | -32                 | 27        | 4, 20 |
|                   | Frequency range   | 1475                  | - | 1488   | -28                 | 1         | 4, 21 |
|                   | Frequency range   | 1475                  | - | 1488   | -50                 | 1         | 4, 22 |
|                   | Frequency range   | 1488                  | - | 1510.9 | -35                 | 1         | 4, 23 |
|                   | Frequency range   | 1488                  | - | 1518   | -50                 | 1         | 4     |
| CA_n2-n14         | Frequency range   | 769                   | - | 775    | -35                 | 0.00625   | 4     |
|                   | Frequency range   | 799                   | - | 805    | -35                 | 0.00625   | 4     |
| CA_n3-n8          | Frequency range   | 1884.5                | - | 1915.7 | -41                 | 0.3       | 3     |
| CA_n3-n18         | Frequency range   | 945                   | - | 960    | -50                 | 1         |       |
|                   | Frequency range   | 1884.5                | - | 1915.7 | -41                 | 0.3       | 3     |
|                   | Frequency range   | 2545                  | - | 2575   | -50                 | 1         |       |

|            |                 |        |   |        |       |         |       |
|------------|-----------------|--------|---|--------|-------|---------|-------|
|            | Frequency range | 2595   | - | 2645   | -50   | 1       |       |
| CA_n3-n20  | Frequency range | 758    | - | 788    | -50   | 1       |       |
| CA_n3-n34  | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3     | 3     |
| CA_n3-n28  | Frequency range | 470    | - | 694    | -42   | 8       | 4, 14 |
|            | Frequency range | 470    | - | 710    | -26.2 | 6       | 15    |
|            | Frequency range | 758    | - | 773    | -30   | 1       | 4     |
|            | Frequency range | 773    | - | 803    | -50   | 1       |       |
|            | Frequency range | 662    | - | 694    | -26.2 | 6       | 4     |
|            | Frequency range | 1839.9 | - | 1879.9 | -50   | 1       | 4     |
|            | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3     | 3, 11 |
| CA_n3-n40  | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3     | 3     |
| CA_n3-n41  | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3     | 3     |
| CA_n3-n74  | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3     | 3     |
|            | Frequency range | 1400   | - | 1427   | -32   | 27      | 4, 20 |
|            | Frequency range | 1475   | - | 1488   | -28   | 1       | 4, 21 |
|            | Frequency range | 1475   | - | 1488   | -50   | 1       | 4, 22 |
|            | Frequency range | 1488   | - | 1510.9 | -35   | 1       | 4, 23 |
|            | Frequency range | 1488   | - | 1518   | -50   | 1       | 4     |
| CA_n3-n77  | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3     | 3     |
| CA_n3-n78  | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3     | 3     |
| CA_n3-n79  | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3     | 3     |
| CA_n5-n40  | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3     | 3     |
| CA_n5-n48  | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3     | 8     |
| CA_n5-n66  | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3     | 3     |
| CA_n5-n77  | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3     | 3     |
| CA_n5-n78  | Frequency range | 945    | - | 960    | -50   | 1       |       |
|            | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3     | 3     |
|            | Frequency range | 2545   | - | 2575   | -50   | 1       | 2     |
|            | Frequency range | 2595   | - | 2645   | -50   | 1       |       |
| CA_n5-n79  | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3     | 3     |
| CA_n7-n28  | Frequency range | 758    | - | 773    | -32   | 1       | 4     |
|            | Frequency range | 773    | - | 803    | -50   | 1       |       |
| CA_n8-n34  | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3     | 3     |
| CA_n8-n40  | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3     | 3     |
| CA_n8-n41  | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3     | 3     |
| CA_n8-n78  | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3     | 3     |
| CA_n8-n79  | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3     | 3     |
| CA_n13-n25 | Frequency range | 769    | - | 775    | -35   | 0.00625 | 4     |
|            | Frequency range | 799    | - | 805    | -35   | 0.00625 | 4     |
| CA_n13-n66 | Frequency range | 769    | - | 775    | -35   | 0.00625 | 4     |
|            | Frequency range | 799    | - | 805    | -35   | 0.00625 | 4     |
| CA_n13-n77 | Frequency range | 769    | - | 775    | -35   | 0.00625 | 4     |
|            | Frequency range | 799    | - | 805    | -35   | 0.00625 | 4     |
| CA_n14-n30 | Frequency range | 769    | - | 775    | -35   | 0.00625 | 4     |
|            | Frequency range | 799    | - | 805    | -35   | 0.00625 | 4     |
| CA_n14-n66 | Frequency range | 769    | - | 775    | -35   | 0.00625 | 4     |
|            | Frequency range | 799    | - | 805    | -35   | 0.00625 | 4     |
| CA_n14-n77 | Frequency range | 769    | - | 775    | -35   | 0.00625 | 4, 20 |
|            | Frequency range | 799    | - | 805    | -35   | 0.00625 | 4, 20 |
| CA_n18-n28 | Frequency range | 470    | - | 694    | -42   | 8       | 4, 14 |
|            | Frequency range | 470    | - | 710    | -26.2 | 6       | 13    |
|            | Frequency range | 662    | - | 694    | -26.2 | 6       | 4     |
|            | Frequency range | 758    | - | 799    | -50   | 1       |       |
|            | Frequency range | 799    | - | 803    | -40   | 1       | 4     |
|            | Frequency range | 860    | - | 890    | -40   | 1       |       |
|            | Frequency range | 945    | - | 960    | -50   | 1       | 4     |
|            | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3     | 3     |
|            | Frequency range | 2545   | - | 2575   | -50   | 1       |       |
| CA_n18-n41 | Frequency range | 2595   | - | 2645   | -50   | 1       |       |
|            | Frequency range | 758    | - | 799    | -50   | 1       |       |
|            | Frequency range | 799    | - | 803    | -40   | 1       |       |
|            | Frequency range | 860    | - | 890    | -40   | 1       |       |
|            | Frequency range | 945    | - | 960    | -50   | 1       |       |
| CA_n18-n74 | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3     | 3     |
|            | Frequency range | 758    | - | 799    | -50   | 1       |       |
|            | Frequency range | 799    | - | 803    | -40   | 1       |       |
|            | Frequency range | 860    | - | 890    | -40   | 1       |       |
|            | Frequency range | 945    | - | 960    | -50   | 1       |       |

|            |                 |        |   |        |       |     |       |
|------------|-----------------|--------|---|--------|-------|-----|-------|
|            | Frequency range | 799    | - | 803    | -40   | 1   |       |
|            | Frequency range | 860    | - | 890    | -40   | 1   |       |
|            | Frequency range | 945    | - | 960    | -50   | 1   |       |
|            | Frequency range | 1400   | - | 1427   | -32   | 27  | 4, 20 |
|            | Frequency range | 1475   | - | 1488   | -28   | 1   | 4, 21 |
|            | Frequency range | 1475   | - | 1488   | -50   | 1   | 4, 22 |
|            | Frequency range | 1488   | - | 1510.9 | -35   | 1   | 4, 23 |
|            | Frequency range | 1488   | - | 1518   | -50   | 1   | 4     |
|            | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3 | 3     |
|            | Frequency range | 2545   | - | 2575   | -50   | 1   |       |
|            | Frequency range | 2595   | - | 2645   | -50   | 1   |       |
| CA_n18-n77 | Frequency range | 758    | - | 799    | -50   | 1   |       |
|            | Frequency range | 799    | - | 803    | -40   | 1   |       |
|            | Frequency range | 860    | - | 890    | -40   | 1   |       |
|            | Frequency range | 945    | - | 960    | -50   | 1   |       |
|            | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3 | 3     |
|            | Frequency range | 2545   | - | 2575   | -50   | 1   |       |
| CA_n18-n78 | Frequency range | 2595   | - | 2645   | -50   | 1   |       |
|            | Frequency range | 758    | - | 799    | -50   | 1   |       |
|            | Frequency range | 799    | - | 803    | -40   | 1   |       |
|            | Frequency range | 860    | - | 890    | -40   | 1   |       |
|            | Frequency range | 945    | - | 960    | -50   | 1   |       |
|            | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3 | 3     |
| CA_n20-n28 | Frequency range | 2545   | - | 2575   | -50   | 1   |       |
|            | Frequency range | 2595   | - | 2645   | -50   | 1   |       |
|            | Frequency range | 758    | - | 773    | -32   | 1   | 4     |
| CA_n26-n66 | Frequency range | 773    | - | 803    | -50   | 1   |       |
|            | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3 | 3     |
| CA_n26-n70 | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3 | 3     |
| CA_n28-n34 | Frequency range | 470    | - | 694    | -42   | 8   | 4, 14 |
|            | Frequency range | 470    | - | 710    | -26.2 | 6   | 13    |
|            | Frequency range | 662    | - | 694    | -26.2 | 6   | 4     |
|            | Frequency range | 758    | - | 773    | -32   | 1   | 4     |
|            | Frequency range | 773    | - | 803    | -50   | 1   |       |
|            | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3 | 3     |
| CA_n28-n39 | Frequency range | 470    | - | 694    | -42   | 8   | 4, 14 |
|            | Frequency range | 470    | - | 710    | -26.2 | 6   | 13    |
|            | Frequency range | 662    | - | 694    | -26.2 | 6   | 4     |
|            | Frequency range | 758    | - | 773    | -32   | 1   | 4     |
|            | Frequency range | 773    | - | 803    | -50   | 1   |       |
| CA_n28-n40 | Frequency range | 758    | - | 773    | -32   | 1   | 4     |
|            | Frequency range | 773    | - | 803    | -50   | 1   |       |
|            | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3 | 3     |
| CA_n28-n41 | Frequency range | 470    | - | 694    | -42   | 8   | 4, 14 |
|            | Frequency range | 470    | - | 710    | -26.2 | 6   | 13    |
|            | Frequency range | 662    | - | 694    | -26.2 | 6   | 4     |
|            | Frequency range | 758    | - | 773    | -32   | 1   | 4     |
|            | Frequency range | 773    | - | 803    | -50   | 1   |       |
|            | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3 | 3, 11 |
| CA_n28-n46 | Frequency range | 470    | - | 694    | -42   | 8   | 15    |
|            | Frequency range | 470    | - | 710    | -26.2 | 6   |       |
|            | Frequency range | 662    | - | 694    | -26.2 | 6   | 15    |
|            | Frequency range | 758    | - | 773    | -32   | 1   | 15    |
|            | Frequency range | 773    | - | 803    | -50   | 1   |       |
|            | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3 | 8, 19 |
| CA_n28-n50 | Frequency range | 470    | - | 694    | -42   | 8   | 4, 14 |
|            | Frequency range | 470    | - | 710    | -26.2 | 6   | 13    |
|            | Frequency range | 662    | - | 694    | -26.2 | 6   | 4     |
|            | Frequency range | 758    | - | 773    | -32   | 1   | 4     |
|            | Frequency range | 773    | - | 803    | -50   | 1   |       |
|            | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3 | 3, 11 |
| CA_n28-n77 | Frequency range | 758    | - | 773    | -32   | 1   |       |
|            | Frequency range | 773    | - | 803    | -50   | 1   |       |
|            | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3 | 3, 11 |
| CA_n28-n74 | Frequency range | 470    | - | 694    | -42   | 8   | 4, 14 |

|            |                 |        |   |        |       |     |          |
|------------|-----------------|--------|---|--------|-------|-----|----------|
|            | Frequency range | 470    | - | 710    | -26.2 | 6   | 13       |
|            | Frequency range | 662    | - | 694    | -26.2 | 6   | 4        |
|            | Frequency range | 758    | - | 773    | -32   | 1   | 4        |
|            | Frequency range | 773    | - | 803    | -50   | 1   |          |
|            | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3 | 3, 11    |
|            | Frequency range | 1400   | - | 1427   | -32   | 27  | 4, 20, 2 |
|            | Frequency range | 1475   | - | 1488   | -28   | 1   | 4, 21, 2 |
|            | Frequency range | 1475   | - | 1488   | -50   | 1   | 4, 22, 2 |
|            | Frequency range | 1488   | - | 1510.9 | -35   | 1   | 4, 23, 2 |
|            | Frequency range | 1488   | - | 1518   | -50   | 1   | 4, 2     |
| CA_n28-n78 | Frequency range | 758    | - | 773    | -32   | 1   |          |
|            | Frequency range | 773    | - | 803    | -50   | 1   |          |
|            | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3 | 3, 11    |
| CA_n28-n79 | Frequency range | 470    | - | 694    | -42   | 8   | 4, 14    |
|            | Frequency range | 470    | - | 710    | -26.2 | 6   | 13       |
|            | Frequency range | 662    | - | 694    | -26.2 | 6   | 4        |
|            | Frequency range | 758    | - | 773    | -32   | 1   | 4        |
|            | Frequency range | 773    | - | 803    | -50   | 1   |          |
|            | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3 | 3, 11    |
| CA_n34-n40 | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3 | 8        |
| CA_n34-n41 | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3 | 3        |
| CA_n34-n79 | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3 | 8        |
| CA_n40-n41 | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3 | 3        |
| CA_n40-n77 | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3 | 3        |
| CA_n40-n78 | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3 | 3        |
| CA_n40-n79 | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3 | 3        |
| CA_n41-n74 | Frequency range | 1884.5 |   | 1915.7 | -41   | 0.3 | 3        |
|            | Frequency range | 1400   | - | 1427   | -32   | 27  | 4, 20    |
|            | Frequency range | 1475   | - | 1488   | -28   | 1   | 4, 21    |
|            | Frequency range | 1475   | - | 1488   | -50   | 1   | 4, 22    |
|            | Frequency range | 1488   | - | 1510.9 | -35   | 1   | 4, 23    |
|            | Frequency range | 1488   | - | 1518   | -50   | 1   | 4        |
| CA_n41-n77 | Frequency range | 1884.5 |   | 1915.7 | -41   | 0.3 | 3        |
| CA_n41-n78 | Frequency range | 1884.5 |   | 1915.7 | -41   | 0.3 | 3        |
| CA_n41-n79 | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3 | 3        |
| CA_n46-n78 | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3 | 8        |
| CA_n71-n77 | Frequency range | 1884.5 |   | 1915.7 | -41   | 0.3 | 3        |
| CA_n74-n77 | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3 | 3        |
|            | Frequency range | 1400   | - | 1427   | -32   | 27  | 4, 20    |
|            | Frequency range | 1475   | - | 1488   | -50   | 1   | 21       |
|            | Frequency range | 1475   | - | 1488   | -28   | 1   | 4, 21    |
|            | Frequency range | 1475   | - | 1488   | -50   | 1   | 4, 22    |
|            | Frequency range | 1488   | - | 1510.9 | -35   | 1   | 4, 23    |
| CA_n74-n78 | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3 | 3        |
|            | Frequency range | 1400   | - | 1427   | -32   | 27  | 4, 20    |
|            | Frequency range | 1475   | - | 1488   | -28   | 1   | 4, 21    |
|            | Frequency range | 1475   | - | 1488   | -50   | 1   | 4, 22    |
|            | Frequency range | 1488   | - | 1510.9 | -35   | 1   | 4, 23    |
| CA_n77-n79 | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3 | 3        |
| CA_n78-n79 | Frequency range | 1884.5 | - | 1915.7 | -41   | 0.3 | 3        |

NOTE 1: Void

NOTE 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.5.3.1-2 are permitted for each assigned NR carrier used in the measurement due to 2nd, 3rd, 4th or 5<sup>th</sup> harmonic spurious emissions. Due to spreading of the harmonic emission the exception is also allowed for the first 1 MHz frequency range immediately outside the harmonic emission on both sides of the harmonic emission. This results in an overall exception interval centred at the harmonic emission of  $(2 \text{ MHz} + N \times L_{\text{CRB}} \times 180\text{kHz})$ , where N is 2, 3, 4, 5 for the 2nd, 3rd, 4th or 5th harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval.

NOTE 3: Applicable when co-existence with PHS system operating in 1884.5 -1915.7 MHz

NOTE 4: These requirements also apply for the frequency ranges that are less than  $F_{\text{OoB}}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

NOTE 5: Void.

NOTE 6: Void

NOTE 7: Void

|          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NOTE 8:  | This requirement is only applicable for carriers with bandwidth confined within 1885-1920 MHz (requirement for carriers with at least 1RB confined within 1880 - 1885 MHz is not specified). This requirement applies for an uplink transmission bandwidth less than or equal to 54 RB for carriers of 15 MHz bandwidth when carrier center frequency is within the range 1892.5 - 1894.5 MHz and for carriers of 20 MHz bandwidth when carrier center frequency is within the range 1895 - 1903 MHz.                                                                                                                                                                                                                                                                              |
| NOTE 9:  | Void.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| NOTE 10: | Void.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| NOTE 11: | Applicable when the assigned NR carrier is confined within 718 MHz and 748 MHz and when the channel bandwidth used is 5 or 10 MHz.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| NOTE 12: | Void                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| NOTE 13: | This requirement is applicable for 5 and 10 MHz NR channel bandwidth allocated within 718 - 728 MHz. For carriers of 10 MHz bandwidth, this requirement applies for an uplink transmission bandwidth less than or equal to 30 RB with RBstart > 1 and RBstart < 48.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| NOTE 14: | This requirement is applicable in the case of a 10 MHz NR carrier confined within 703 MHz and 733 MHz, otherwise the requirement of -25 dBm with a measurement bandwidth of 8 MHz applies.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| NOTE 15: | As exceptions, measurements with a level up to the applicable requirement of -36 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 3rd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 3rd harmonic totally or partially overlaps the measurement bandwidth (MBW).                                                                                                                                                                                                                                                                                                                                                               |
| NOTE 17: | Void.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| NOTE 18: | Void                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| NOTE 19: | This requirement is applicable for power class 3 UE for any channel bandwidths within the range 2570 - 2615 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2605.5 - 2607.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2597 - 2605 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB. For power class 2 UE for any channel bandwidths within the range 2570 - 2615 MHz, NS_44 shall apply. For power class 2 or 3 UE for carriers with channel bandwidth overlapping the frequency range 2615 - 2620 MHz the requirement applies with the maximum output power configured to +19 dBm in the IE P-Max. |
| NOTE 20: | Applicable for cases and when the lower edge of the assigned NR UL channel bandwidth frequency is greater than or equal to 1427 MHz + the channel BW assigned for 5 and 10 MHz bandwidth, and when the lower edge of the assigned NR UL channel bandwidth frequency is greater than or equal to 1440 MHz for 15 and 20 MHz bandwidth.                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| NOTE 21: | Applicable for 5 MHz bandwidth, and when the upper edge of the assigned NR UL channel bandwidth frequency is less than or equal to 1467 MHz assigned for 10 MHz bandwidth, and when the upper edge of the assigned NR UL channel bandwidth frequency is less than or equal to 1463.8 MHz for 15 MHz bandwidth, and when the upper edge of the assigned NR UL channel bandwidth.                                                                                                                                                                                                                                                                                                                                                                                                    |
| NOTE 22: | As exceptions, for 90 and 100 MHz channel bandwidth, -40 dBm/MHz is applicable in the frequency range of 2496 – 2505 MHz.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| NOTE 23: | For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

6.5A.3.2.4      Void

6.5A.3.2.5      Void

6.5A.3.2.6      Void

### 6.5A.3.3      Additional spurious emissions for CA

#### 6.5A.3.3.1      Additional spurious emissions for intra-band contiguous CA

##### 6.5A.3.3.1.1      Requirement for network signalling value "CA\_NS\_04"

When "CA\_NS04" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5A.3.3.1.1-1. This requirement also applies for the frequency ranges that are less than FOOB (MHz) in Table 6.5A.3.1-1 from the edge of the aggregated channel bandwidth. For power class 2 intra-band contiguous carrier aggregation, the additional spurious emissions is measured as the sum from both UE transmit antenna connectors when UE indicates support for *dualPA-Architecture* IE.

**Table 6.5A.3.3.1.1-1: Additional requirements for "CA\_NS\_04"**

| Frequency range (MHz)  | BWChannel_CA (MHz) / Spectrum emission limit (dBm) | Measurement bandwidth                        |
|------------------------|----------------------------------------------------|----------------------------------------------|
|                        | 20 to 190 MHz                                      |                                              |
| $2495 \leq f < 2496$   | -13                                                | Max(1 % of BW <sub>Channel_CA</sub> , 1 MHz) |
| $2490.5 \leq f < 2495$ | -13                                                | 1 MHz                                        |
| $0.009 < f < 2490.5$   | -25                                                | 1 MHz                                        |

#### 6.5A.3.3.1.2 Requirement for network signalling value "CA\_NS\_27"

When "CA\_NS 27" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5A.3.3.1.2-1. This requirement also applies for the frequency ranges that are less than  $F_{OOB}$  (MHz) in Table 6.5A.3.1-1 from the edge of the aggregated channel bandwidth.

**Table 6.5A.3.3.1.2-1: Additional requirements for "CA\_NS\_27"**

| Frequency range (MHz) | Spectrum emission limit (dBm) for aggregated channel bandwidth of max 40 MHz | Measurement bandwidth |
|-----------------------|------------------------------------------------------------------------------|-----------------------|
| 9 kHz – 3530 MHz      | -40                                                                          | 1 MHz                 |
| 3530 MHz – 3540 MHz   | -25                                                                          |                       |
| 3710 MHz – 3720 MHz   | -25                                                                          |                       |
| 3720 MHz – 12.75 GHz  | -40                                                                          |                       |

#### 6.5A.3.3.1.3 Requirement for network signalling value "CA\_NS\_46"

When "CA\_NS 46" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5A.3.3.1.3-1. This requirement also applies for the frequency ranges that are less than  $F_{OOB}$  (MHz) in Table 6.5A.3.1-1 from the edge of the aggregated channel bandwidth.

**Table 6.5A.3.3.1.3-1: Additional requirements for "CA\_NS\_46"**

| Protected band                                                                                                                                    | Frequency range (MHz) |   |      | Maximum Level (dBm) | MBW (MHz) | NOTE |
|---------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---|------|---------------------|-----------|------|
| Frequency range                                                                                                                                   | 2570                  | - | 2575 | +1.6                | 5         | 1, 2 |
| Frequency range                                                                                                                                   | 2575                  | - | 2595 | -15.5               | 5         | 1, 2 |
| Frequency range                                                                                                                                   | 2595                  | - | 2620 | -40                 | 1         | 1    |
| NOTE 1: This requirement is applicable for carriers confined in 2500-2570 MHz.                                                                    |                       |   |      |                     |           |      |
| NOTE 2: For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band. |                       |   |      |                     |           |      |

#### 6.5A.3.3.2 Additional spurious emissions for intra-band non-contiguous CA

##### 6.5A.3.3.2.1 Requirement for network signalling value "CA\_NC\_NS\_04"

For intra-band non-cotiguous CA<sub>n41(2A)</sub>, the spurious emission requirements in subclause 6.5.3.3.1 (indicated by NS\_04) applies in each uplink CC.

### 6.5A.4 Transmit intermodulation for CA

#### 6.5A.4.2.1 Transmit intermodulation for intra-band contiguous CA

For intra-band contiguous carrier aggregation the requirement of transmitting intermodulation is specified in Table 6.5A.4.2.1-1.

**Table 6.5A.4.2.1-1: Transmit Intermodulation**

| CA bandwidth class(UL)                                                                                                                                                                                                                  | B and C                                                                      |                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| Interference Signal Frequency Offset                                                                                                                                                                                                    | $BW_{\text{Channel\_CA}}$                                                    | $2 \cdot BW_{\text{Channel\_CA}}$                                       |
| Interference CW Signal Level                                                                                                                                                                                                            | -40dBc                                                                       |                                                                         |
| Intermodulation Product                                                                                                                                                                                                                 | -29dBc                                                                       | -35dBc                                                                  |
| Measurement bandwidth (NOTE1)                                                                                                                                                                                                           | Nominal channel space + $MBW_{\text{ACLR,low}}/2 + MBW_{\text{ACLR,high}}/2$ |                                                                         |
| Measurement offset from channel center                                                                                                                                                                                                  | $BW_{\text{Channel\_CA}}$ and $2 \cdot BW_{\text{Channel\_CA}}$              | $2 \cdot BW_{\text{Channel\_CA}}$ and $4 \cdot BW_{\text{Channel\_CA}}$ |
| NOTE 1: $MBW_{\text{ACLR,low}}$ and $MBW_{\text{ACLR,high}}$ are the single-channel ACLR measurement bandwidths specified for channel bandwidths $BW_{\text{channel(LOW)}}$ and $BW_{\text{channel(HIGH)}}$ in 6.5.2.4.1, respectively. |                                                                              |                                                                         |

6.5A.4.2.2 Void

6.5A.4.2.3 Transmit intermodulation for Inter-band CA

For inter-band carrier aggregation with two contiguous carriers assigned to one NR band, the transmit intermodulation requirements in subclause 6.5A.4.2.1 apply for that band.

For inter-band carrier aggregation with two uplink non-contiguous carrier assigned to one NR band, the transmit intermodulation requirements in subclause 6.5A.4.2.2 apply for that band.

For inter-band carrier aggregation with uplink assigned to two NR bands, the transmit intermodulation requirement is specified in Table 6.5.4-1 which shall apply on each component carrier with both component carriers active.

For combinations of intra-band and inter-band carrier aggregation with three uplink component carriers (up to two contiguously aggregated carriers per operating band) transmit intermodulation is defined as follows. For the NR band supporting one component carrier the requirement specified in Table 6.5.4-1 apply. For the NR band supporting two contiguous component carriers the requirements specified in Table 6.5A.4.2.1-1 apply.

## 6.5B Output RF spectrum emissions for NR-DC

For inter-band NR-DC with one uplink carrier assigned per NR band, the output RF spectrum emissions for the corresponding inter-band CA configuration as specified in clause 6.5A applies.

## 6.5D Output RF spectrum emissions for UL MIMO

### 6.5D.1 Occupied bandwidth for UL MIMO

For UE supporting UL MIMO, the requirements for occupied bandwidth apply to the sum of the powers from both UE transmit antenna connectors. The occupied bandwidth is defined as the bandwidth containing 99 % of the total integrated mean power of the transmitted spectrum on the assigned channel at each transmit antenna connector.

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the occupied bandwidth shall be less than the channel bandwidth specified in table 6.5.1-1. The requirements shall be met with UL MIMO configurations described in clause 6.2D.1.

If UE is scheduled for single antenna-port PUSCH transmission by DCI format 0\_0 or by DCI format 0\_1 for single antenna port codebook based transmission with precoding matrix  $W=1$  [6.3.1.5 TS 38.211], the requirements in clause 6.5.1 apply when  $TxD$  is not indicated, and the requirements in clause 6.5G.1 apply when  $TxD$  is indicated.



## 6.5D.2 Out of band emission for UL MIMO

For UE supporting UL MIMO or uplink full power transmission (ULFPTx) for UL MIMO, the requirements for Out of band emissions resulting from the modulation process and non-linearity in the transmitters is defined as the sum of the emissions from both UE transmit antenna connectors.

For UEs with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the requirements in subclause 6.5.2 apply. The requirements shall be met with UL MIMO configurations described in clause 6.2D.1.

For UE support uplink full power transmission (ULFPTx) for UL MIMO, the requirements in clause 6.5.2 shall apply. The requirements shall be met with the PUSCH configurations specified in Table 6.2D.1-3, based upon UE's support of uplink full power transmission mode.

If UE is scheduled for single antenna-port PUSCH transmission by DCI format 0\_0 or by DCI format 0\_1 for single antenna port codebook based transmission with precoding matrix  $W=1$  [6.3.1.5 TS 38.211], the requirements in clause 6.5.2 apply when  $TxD$  is not indicated, and the requirements in clause 6.5G.2 apply when  $TxD$  is indicated.

## 6.5D.3 Spurious emission for UL MIMO

For UE supporting UL MIMO or uplink full power transmission (ULFPTx) for UL MIMO, the requirements for Spurious emissions which are caused by unwanted transmitter effects such as harmonics emission, parasitic emissions, intermodulation products and frequency conversion products is defined as the sum of the emissions from both UE transmit antenna connectors.

For UEs with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the requirements specified in subclause 6.5.3 apply. The requirements shall be met with the UL MIMO configurations described in clause 6.2D.1.

For UE support uplink full power transmission (ULFPTx) for UL MIMO, the requirements in clause 6.5.3 shall apply. The requirements shall be met with the PUSCH configurations specified in Table 6.2D.1-3, based upon UE's support of uplink full power transmission mode.

If UE is scheduled for single antenna-port PUSCH transmission by DCI format 0\_0 or by DCI format 0\_1 for single antenna port codebook based transmission with precoding matrix  $W=1$  [6.3.1.5 TS 38.211], the requirements in clause 6.5.3 apply when  $TxD$  is not indicated, and the requirements in clause 6.5G.3 apply when  $TxD$  is indicated.

## 6.5D.4 Transmit intermodulation for UL MIMO

For UE supporting UL MIMO, the transmit intermodulation requirements are specified at each transmit antenna connector and the wanted signal is defined as the sum of output powers from both UE transmit antenna connectors.

For UEs with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the requirements specified in clause 6.5.4 apply to each transmit antenna connector. The requirements shall be met with the UL MIMO configurations described in clause 6.2D.1.

If UE is scheduled for single antenna-port PUSCH transmission by DCI format 0\_0 or by DCI format 0\_1 for single antenna port codebook based transmission with precoding matrix  $W=1$  [6.3.1.5 TS 38.211], the requirements in clause 6.5.4 apply when  $TxD$  is not indicated, and the requirements in clause 6.5G.4 apply when  $TxD$  is indicated.

## 6.5E Output RF spectrum emissions for V2X

### 6.5E.1 Occupied bandwidth for V2X

#### 6.5E.1.1 General

When UE is configured for NR V2X sidelink transmissions non-concurrent with NR uplink transmissions for NR V2X operating bands specified in Table 5.2E.1-1, the requirements in clause 6.5.1 shall apply for NR V2X sidelink transmission.

For NR V2X UE with two transmit antenna connectors, the occupied bandwidth at each transmitter antenna shall be less than the channel bandwidth specified in Table 6.5.1-1.

If V2X UE transmits on one antenna connector at a time, the requirements specified for single carrier shall apply to the active antenna connector.

### 6.5E.1.2 Occupied bandwidth for V2X concurrent operation

For the inter-band concurrent NR V2X operation, the requirements specified in clause 6.5.1 shall apply for the uplink in licensed band and the requirements specified in clause 6.5E.1.1 shall apply for the sidelink in licensed band or Band n47.

For the intra-band concurrent NR V2X operation, the requirements specified in clause 6.5.1 shall apply for the uplink in licensed band and the requirements specified in clause 6.5E.1 shall apply for the sidelink in licensed band.

## 6.5E.2 Out of band emission for V2X

### 6.5E.2.1 General

When UE is configured for NR V2X sidelink transmissions non-concurrent with NR uplink transmissions for NR V2X operating bands specified in Table 5.2E.1-1, the requirements in clause 6.5E.2.2.1, 6.5E.2.3 and 6.5E.2.4.1 apply for NR V2X sidelink transmission.

For NR V2X UE with two transmit antenna connectors, the requirements specified for single carrier shall apply to each transmit antenna connector.

### 6.5E.2.2 Spectrum emission mask

#### 6.5E.2.2.1 General

For NR V2X UE, the existing NR general spectrum emission mask in subclause 6.5.2.2 applies for all supporting NR V2X channel bandwidths. The spectrum emission mask of the UE applies to frequencies ( $\Delta f_{\text{OoB}}$ ) starting from the  $\pm$  edge of the assigned NR channel bandwidth. For frequencies greater than ( $\Delta f_{\text{OoB}}$ ), the power of any UE emission shall not exceed the levels specified in Table 6.5.2.2-1 for the specified channel bandwidth for NR V2X operating bands in Table 5.2E.1-1.

#### 6.5E.2.2.2 Spectrum emission mask for V2X concurrent operation

For the inter-band concurrent NR V2X operation, the general/additional SEM requirements specified in clause 6.5.2 shall apply for the uplink in licensed band and the general/additional SEM requirements specified in clause 6.5E.2.2.1 shall apply for the sidelink in licensed band or Band n47.

For intra-band NR V2X transmission with bandwidth class B where Uu and SL overlap in time the specifications in section 6.5A.2.2.1 and 6.5A.2.2.2 apply.

### 6.5E.2.3 Additional Spectrum emission mask

#### 6.5E.2.3.1 Requirements for network signalling value "NS\_33"

The additional spectrum mask in Table 6.5E.2.3.1-1 applies for NR V2X UE within 5855 MHz to 5925 MHz according to ETSI EN 302 571. Additional spectrum emission requirements are signalled by the network to indicate that the UE shall meet an additional requirement for a specific deployment scenario as part of the cell handover/broadcast message.

When "NS\_33" is indicated in the cell or pre-configured radio parameters, the power of any V2X UE emission shall not exceed the levels specified in Table 6.5E.2.3.1-1.

**Table 6.5E.2.3.1-1: Additional spectrum mask requirements for 10MHz channel bandwidth**

| Spectrum emission limit (dBm EIRP)/ Channel bandwidth |                                                                                        |                       |
|-------------------------------------------------------|----------------------------------------------------------------------------------------|-----------------------|
| $\Delta f_{\text{OoB}}$ (MHz)                         | 10 MHz                                                                                 | Measurement bandwidth |
| $\pm 0-0.5$                                           | $[-13 - 12 \left( \frac{ \Delta f_{\text{OoB}} }{\text{MHz}} \right)]$                 | 100 kHz               |
| $\pm 0.5-5$                                           | $[-19 - \frac{16}{9} \left( \frac{ \Delta f_{\text{OoB}} }{\text{MHz}} - 0.5 \right)]$ | 100 kHz               |
| $\pm 5-10$                                            | $[-27 - 2 \left( \frac{ \Delta f_{\text{OoB}} }{\text{MHz}} - 5.0 \right)]$            | 100 kHz               |

NOTE 1: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

NOTE 2: Additional SEM for NR V2X overrides any other requirements in frequency range 5855-5925MHz.

NOTE 3: The EIRP requirement is converted to conducted requirement depend on the supported post antenna connector gain  $G_{\text{post connector}}$  declared by the UE following the principle described in annex I in [11].

### 6.5E.2.3.2 Requirements for network signalling value "NS\_52"

The additional spectrum mask in Table 6.5E.2.3.2-1 applies for NR V2X UE within 5 765 MHz to 6 005 MHz according to FCC regulation. Additional spectrum emission requirements are signalled by the network to indicate that the UE shall meet an additional requirement for a specific deployment scenario as part of the cell handover/broadcast message.

When "NS\_52" is indicated in the cell or pre-configured radio parameters, the power of any V2X UE emission shall not exceed the levels specified in Table 6.5E.2.3.2-1.

**Table 6.5E.2.3.2-1: Additional spectrum mask requirements for 40MHz channel bandwidth (fc = 5885MHz)**

| $\Delta f_{\text{OoB}}$ (MHz) | Emission Limit (dBm) | Measurement Bandwidth |
|-------------------------------|----------------------|-----------------------|
| $\pm 0-2$                     | -32                  | 100kHz                |
| $\pm 2-10$                    | -36                  | 100kHz                |
| $\pm 10-20$                   | -38                  | 100kHz                |
| $\pm 20-40$                   | -43                  | 100kHz                |
| $\pm 40-100$                  | -50                  | 100kHz                |

NOTE: The ASE requirements for NS\_52 will not be verified until the corresponding regulation release a formal rule for C-V2X emission limits.

### 6.5E.2.3.3 Requirements for network signalling value "NS\_06"

The additional spectrum mask are signalled by the network to indicate that the public safety (PS) UE in NR band n14 shall meet an additional for a specific deployment scenarios.

When "NS\_06" is indicated by serving cell or pre-configured radio parameters, the power of any PS UE emission shall not exceed the levels specified in Table 6.5.2.3.4-1.

## 6.5E.2.4 Adjacent channel leakage ratio

### 6.5E.2.4.1 General

Adjacent Channel Leakage power Ratio (ACLR) is the ratio of the filtered mean power centred on the assigned channel frequency to the filtered mean power centred on an adjacent channel frequency.

For NR V2X UE, the existing ACLR requirement for NR uplink transmission in clause 6.5.2.4 are applied for NR V2X UE for NR V2X operating bands in 5.2E.1-1.

For NR V2X UE with two transmit antenna connectors, the requirements specified for single carrier shall apply to each transmit antenna connector.

If V2X UE transmits on one antenna connector at a time, the requirements specified for single carrier shall apply to the active antenna connector.

### 6.5E.2.4.2 ACLR for V2X concurrent operation

For the inter-band concurrent NR V2X operation, the ACLR requirement specified in clause 6.5.2.4 shall apply for the uplink in licensed band and the ACLR requirement specified in clause 6.5E.2.4.1 shall apply for the sidelink in licensed band or Band n47.

For the intra-band NR V2X operation with bandwidth classes B where Uu and SL transmission overlaps in time, the ACLR requirement specified in clause 6.5A.2.4.1 shall apply for the both uplink and sidelink transmission in licensed band.

## 6.5E.3 Spurious emissions for V2X

### 6.5E.3.1 General spurious emissions

When UE is configured for NR V2X sidelink transmissions non-concurrent with NR uplink transmissions for NR V2X operating bands specified in Table 5.2E.1-1, the general spurious emission requirements in clause 6.5.3.1 shall apply for NR V2X sidelink transmission.

For NR V2X UE with two transmit antenna connectors, the requirements specified for single carrier shall apply to each transmit antenna connector.

### 6.5E.3.2 Spurious emissions for UE co-existence

When UE is configured for NR V2X sidelink transmissions non-concurrent with NR uplink transmissions for NR V2X operating bands specified in Table 5.2E.1-1, the requirements in clause 6.5.3.2 shall apply for NR V2X sidelink transmission.

For NR V2X UE with two transmit antenna connectors, the requirements specified for single carrier shall apply to each transmit antenna connector.

### 6.5E.3.3 Spurious emissions for UE co-existence for V2X concurrent operation

This clause specifies the additional requirements for inter-band concurrent V2X operation with the single CC uplink assigned to two NR bands for coexistence with protected bands for the specified simultaneous transmission of the inter-band concurrent V2X configurations in Table 6.5E.3.3-1. The intersection of the requirements for the individual bands specified in clause 6.5.3.2 shall also apply for the specified simultaneous transmission of the inter-band concurrent V2X. Intersection of a requirement means that both UL or sidelink transmission constituent bands have the same protected band requirement specified and if one or both protected bands have note(s) associated those note(s) also apply.

For the inter-band concurrent NR V2X operation, the UE-coexistence requirements in Table 6.5E.3.3.1-1 apply for the corresponding inter-band concurrent operation with transmission assigned to both uplink in licensed band and sidelink in Band n47.

NOTE: For inter-band concurrent V2X operation with uplink assigned to NR band and sidelink transmission assigned to NR V2X operating bands, the requirements in Table 6.5E.3.3-1 could be verified by measuring spurious emissions at the specific frequencies where second and third order intermodulation products generated by the two transmitted carriers can occur; in that case, the requirements for remaining applicable frequencies in Table 6.5E.3.3-1 and in clause 6.5.3.2 would be considered to be verified by the measurements verifying the one uplink inter-band concurrent UE to UE co-existence requirements.

**Table 6.5E.3.3-1: Requirements for inter-band concurrent V2X operation**

| V2X<br>concurrent<br>operating<br>band<br>configuration                                                      | Spurious emission |                          |   |      |                           |              |      |
|--------------------------------------------------------------------------------------------------------------|-------------------|--------------------------|---|------|---------------------------|--------------|------|
|                                                                                                              | Protected band    | Frequency range<br>(MHz) |   |      | Maximum<br>Level<br>(dBm) | MBW<br>(MHz) | NOTE |
| V2X_n1A-<br>n47A                                                                                             | Frequency range   | 5925                     | - | 5945 | -30                       | 1            | 3    |
|                                                                                                              | Frequency range   | 5835                     | - | 5855 | -30                       | 1            | 3    |
| V2X_n8A-<br>n47A                                                                                             | Frequency range   | 5925                     | - | 5945 | -30                       | 1            | 3    |
|                                                                                                              | Frequency range   | 5835                     | - | 5855 | -30                       | 1            | 3    |
| V2X_n39A-<br>n47A                                                                                            | Frequency range   | 5925                     | - | 5945 | -30                       | 1            | 3    |
|                                                                                                              | Frequency range   | 5835                     | - | 5855 | -30                       | 1            | 3    |
| V2X_n40A-<br>n47A                                                                                            | Frequency range   | 5925                     | - | 5945 | -30                       | 1            | 3    |
|                                                                                                              | Frequency range   | 5835                     | - | 5855 | -30                       | 1            | 3    |
| V2X_n41A-<br>n47A                                                                                            | Frequency range   | 5925                     | - | 5945 | -30                       | 1            | 3    |
|                                                                                                              | Frequency range   | 5835                     | - | 5855 | -30                       | 1            | 3    |
| V2X_n71A-<br>n47A                                                                                            | Frequency range   | 5925                     | - | 5945 | -30                       | 1            | 3    |
|                                                                                                              | Frequency range   | 5835                     | - | 5855 | -30                       | 1            | 3    |
| V2X_n78A-<br>n47A                                                                                            | Frequency range   | 5925                     | - | 5945 | -30                       | 1            | 3    |
|                                                                                                              | Frequency range   | 5835                     | - | 5855 | -30                       | 1            | 3    |
| NOTE 1: Void                                                                                                 |                   |                          |   |      |                           |              |      |
| NOTE 2: Void                                                                                                 |                   |                          |   |      |                           |              |      |
| NOTE 3: Applicable when NS_33 is configured by the pre-configured radio parameters for power class 3 V2X UE. |                   |                          |   |      |                           |              |      |
| NOTE 4: Void.                                                                                                |                   |                          |   |      |                           |              |      |

For the intra-band NR V2X transmission where  $U_u$  and  $S_{\text{Loverlap}}$  in time, the UE-coexistence requirements in Table 6.5A.3.2.1-1 apply for the corresponding intra-band concurrent operation for the both uplink and sidelink transmission in licensed band.

### 6.5E.3.4 Additional spurious emissions requirements for V2X

#### 6.5E.3.4.1 General

This clause specifies additional spurious emission requirements for V2X operation

#### 6.5E.3.4.2 Requirements for network signalling value "NS\_33"

**Table 6.5E.3.4.2-1: Additional requirements for "NS\_33"**

| Protected band                                                                                                                                                                                                              | Frequency range (MHz) |   |      | Maximum Level (EIRP <sup>2</sup> ) | MBW (MHz) | NOTE |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---|------|------------------------------------|-----------|------|
| Frequency range                                                                                                                                                                                                             | 5925                  | - | 5945 | -30                                | 1         |      |
| Frequency range                                                                                                                                                                                                             | 5835                  | - | 5855 | -30                                | 1         |      |
| NOTE 1: Void.                                                                                                                                                                                                               |                       |   |      |                                    |           |      |
| NOTE 2: The EIRP requirement is converted to conducted requirement depend on the supported post antenna connector gain $G_{\text{post connector}}$ declared by the UE following the principle described in annex I in [11]. |                       |   |      |                                    |           |      |
| NOTE 3: Void.                                                                                                                                                                                                               |                       |   |      |                                    |           |      |

When "NS\_33" is configured from pre-configured radio parameters or the cell, and the indication from upper layers has indicated that the UE is within the protection zone of CEN DSRC devices or HDR DSRC devices, the power of any NR V2X UE emission shall fulfil either one of the two sets of conditions.

**Table 6.5E.3.4.2-2: Requirements for spurious emissions to protect CEN DSRC for V2X UE**

|                                                                                                                                                                                                                             | Maximum Transmission Power<br>(dBm EIRP <sup>1</sup> ) | Emission Limit in Frequency Range 5795-5815 (dBm/MHz<br>EIRP <sup>1</sup> ) |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|-----------------------------------------------------------------------------|
| Condition 1                                                                                                                                                                                                                 | 10                                                     | -65                                                                         |
| Condition 2                                                                                                                                                                                                                 | 10                                                     | -45                                                                         |
| NOTE 1: The EIRP requirement is converted to conducted requirement depend on the supported post antenna connector gain $G_{\text{post connector}}$ declared by the UE following the principle described in annex I in [11]. |                                                        |                                                                             |

6.5E.3.4.3      Void

## 6.5E.4    Transmit intermodulation

### 6.5E.4.1    General

When UE is configured for NR V2X sidelink transmissions non-concurrent with NR uplink transmissions for NR V2X operating bands specified in Table 5.2E.1-1, the requirements in clause 6.5.4 apply for NR V2X sidelink transmission.

For NR V2X UE with two transmit antenna connectors, the requirements specified for single carrier shall apply to each transmit antenna connector.

### 6.5E.4.2    Transmit intermodulation for V2X concurrent operation

For the inter-band concurrent NR V2X operation, the requirements specified in clause 6.5.4 shall apply for the uplink in licensed band and the requirements specified in clause 6.5E.4.1 shall apply for the sidelink in licensed band or Band n47.

For the intra-band NR V2X operation where Uu and SL transmission overlaps in time, the requirements specified in clause 6.5A.4 shall apply for both uplink and sidelink in licensed band

## 6.5F    Output RF spectrum emissions for shared spectrum channel access

### 6.5F.1    Occupied bandwidth

The requirements for occupied bandwidth in clause 6.5.1 apply for the specified NR-U channel bandwidths in Table 5.3.5-1.

### 6.5F.2    Out of band emission

#### 6.5F.2.1    General

The Out of band emissions are unwanted emissions immediately outside the assigned channel bandwidth resulting from the modulation process and non-linearity in the transmitter but excluding spurious emissions. This out of band emission limit is specified in terms of a spectrum emission mask and an adjacent channel leakage power ratio.

To improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

## 6.5F.2.2 Spectrum emission mask for operation with shared spectrum channel access

### 6.5F.2.2.0 General

Instead of the general spectrum emission mask requirement in clause 6.5.2.2, when operating with shared spectrum channel access the relative power of any UE emission shall not exceed the levels specified in Table 6.5F.2.2.0-1 for the specified channel bandwidth or -30 dBm/MHz whichever is the greatest. The spectrum emission mask for operation with shared spectrum channel access is defined relative to the maximum power density in a 1 MHz measurement bandwidth within the channel bandwidth.

The spectrum emission mask for operation with shared spectrum channel access applies to frequencies ( $\Delta f_{\text{OoB}}$ ) starting from the  $\pm$  edge of the assigned channel bandwidth. For frequencies offset greater than  $\Delta f_{\text{OoB}}$ , the spurious requirements in clause 6.5.3 are applicable.

**Table 6.5F.2.2.0-1: Spectrum emission mask for operation with shared spectrum channel access**

| Spectrum emission limit (dBr) / Channel bandwidth                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                              |                                   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|-----------------------------------|
| $\Delta f_{\text{OoB}}$<br>(MHz)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 10, 20, 40, 60, 80, 100 MHz                                                                  | Measurement<br>bandwidth<br>(MBW) |
| $\pm 0-1$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | $-20  \Delta f_{\text{OoB}} $                                                                | $[100\text{kHz}]^3$               |
| $\pm 1-(\text{BW}_{\text{Channel}} / 2)$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | $-20 - (8 / A)  \Delta f_{\text{OoB}} - 1 $ where $A = (\text{BW}_{\text{Channel}} / 2) - 1$ | 1 MHz                             |
| $\pm (\text{BW}_{\text{Channel}} / 2) - \text{BW}_{\text{Channel}}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | $-16 - (24 / \text{BW}_{\text{Channel}})  \Delta f_{\text{OoB}} $                            |                                   |
| $< -\text{BW}_{\text{Channel}}$ OR $> \text{BW}_{\text{Channel}}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | -40                                                                                          |                                   |
| NOTE 1: Void<br>NOTE 2: Void<br>NOTE 3: The measured value shall be scaled by a factor equal to the ratio of the reference bandwidth (1 MHz) to the measurement bandwidth before the emission limit (dBr) is applied.<br>NOTE 4: The carrier leakage exceptions from Table 6.4F.2.3-1 apply and carrier leakage contribution shall be removed prior to setting the 0dBr level of the mask, the reported carrier frequency location in <i>txDirectCurrentLocation</i> field of the <i>UplinkTxDirectCurrentBWP</i> can be used to cancel the carrier leakage contribution. If <i>txDirectCurrentLocation</i> is not available or is reported with value 3300 or 3301, a carrier frequency location at the center of the channel shall be assumed. |                                                                                              |                                   |

For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2.

### 6.5F.2.2.1 Spectrum emission mask for non-transmitted channels

In the case of non-transmitted 20 MHz channel(s) on the edges of an assigned channel bandwidth the spectrum emission mask for operation with shared spectrum channel access, specified in Table 6.5F.2.2.0-1, is applied by using the total bandwidth of the remaining transmitted channels. The spectrum emission mask for non-transmitted channels is floored at -28dBr.

The relative power of any UE emission shall not exceed the most stringent levels given by the spectrum emission mask for operation with shared spectrum channel access with full channel bandwidth and the spectrum emission mask for non-transmitted channels with the channel bandwidth of the transmitted channels in the case of non-transmitted channels at the edge of an assigned channel bandwidth.

An exception to the spectrum emission mask for non-transmitted channels allows a single [2] MHz bandwidth to extend to [-28] dBc relative to total transmit power, or [-20] dBm, whichever is the greatest.

### 6.5F.2.3 Additional spectrum emission mask

There are no additional spectrum emission mask requirements in this version of the specification.

## 6.5F.2.4 Adjacent channel leakage ratio

### 6.5F.2.4.0 General

Adjacent Channel Leakage power Ratio (ACLR) is the ratio of the filtered mean power centred on the assigned channel frequency to the filtered mean power centred on an adjacent channel frequency.

To improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

### 6.5F.2.4.1 Shared spectrum channel access ACLR

The Adjacent Channel Leakage power Ratio is the ratio of the filtered mean power centred on the assigned channel frequency to the filtered mean power centred on an adjacent channel frequency at nominal channel spacing. The assigned channel power and adjacent channel power are measured with rectangular filters with measurement bandwidths specified in Table 6.5.2.4.1-1.

Instead of the general ACLR requirement in clause 6.5.2.4, if the measured adjacent channel power is greater than  $-47$  dBm then the ACLR shall be higher than the value specified in Table 6.5F.2.4.1-1.

**Table 6.5F.2.4.1-1: Shared spectrum channel access ACLR requirement**

|      | Power class 5 |
|------|---------------|
| ACLR | 27 dB         |

### 6.5F.2.4.2 Additional requirement for network signalled value "NS\_29"

When "NS\_29" is indicated in the cell, the UE emission shall meet the additional requirements specified in Table 6.5F.2.4.2-1 for shared spectrum channels assigned within 5150 – 5350 MHz and 5470 – 5730 MHz.

**Table 6.5F.2.4.2-1: ACLR2 requirement for "NS\_29"**

| Power class 5                                  | 20 MHz    | 40 MHz    | 60, 80 MHz |
|------------------------------------------------|-----------|-----------|------------|
| ACLR2                                          | 40 dB     | 40 dB     | N/A        |
| Measurement bandwidth                          | 20 MHz    | 40 MHz    | N/A        |
| Adjacent channel center frequency offset (MHz) | +40 / -40 | +80 / -80 | N/A        |

## 6.5F.2A Out of band emission for CA

### 6.5F.2A.1 Spectrum emission mask for CA

#### 6.5F.2A.1.1 Spectrum emission mask for Inter-band CA

For inter-band carrier aggregation with uplink assigned to two bands and including one of the bands listed in Table 6.2F.1-1, the spectrum emission mask requirements in clause 6.5.2.1 and 6.5.2.2 apply for the NR uplink carrier and clause 6.5F.2.1 and 6.5F.2.2 for the carrier operating with shared spectrum access.

For combinations of intra-band and inter-band carrier aggregation with three uplink component carriers (up to two contiguously aggregated carriers per operating band and including one of the bands listed in Table 6.2F.1-1), the spectrum emission mask of the UE is defined per band while all component carriers are active. For the NR band supporting two contiguous component carriers the requirements specified in subclause 6.5A.2.2.1 apply. For the shared spectrum defined band supporting one component carrier the requirements in subclauses 6.5F.2.2 apply.



## 6.5F.2A.1.2 Spectrum emission mask for Intra-band contiguous CA

### 6.5F.2A.1.2.1 General

For intra-band contiguous carrier aggregation operation with shared spectrum channel access, the relative power of any UE emission shall not exceed the levels specified in Table 6.5F.2A.1.1-1 for the specified aggregated channel bandwidth or -30 dBm/MHz whichever is the greatest. The spectrum emission mask for operation with shared spectrum channel access is defined relative to the maximum power density in a 1 MHz measurement bandwidth within the aggregated channel bandwidth.

The spectrum emission mask for operation with shared spectrum channel access applies to frequencies ( $\Delta f_{\text{OOB}}$ ) starting from the  $\pm$  edge of the assigned aggregated channel bandwidth. For frequencies offset greater than  $\Delta f_{\text{OOB}}$ , the spurious requirements in clause 6.5.3 are applicable.

**Table 6.5F.2A.1.2-1: Spectrum emission mask for intra-band contiguous CA operation with shared spectrum channel access**

| Spectrum emission limit (dBr) / Channel bandwidth                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                               |                                   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|-----------------------------------|
| $\Delta f_{\text{OOB}}$<br>(MHz)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 10, 20, 40, 60, 80, 100 MHz                                                                                   | Measurement<br>bandwidth<br>(MBW) |
| $\pm 0\text{-}1$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | $-20 \left  \Delta f_{\text{OOB}} \right $                                                                    | $[100\text{kHz}]^3$               |
| $\pm 1\text{-(BW}_{\text{Channel\_CA}} / 2)$                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | $-20 - (8 / A) \left  \Delta f_{\text{OOB}} - 1 \right $ where $A = (\text{BW}_{\text{Channel\_CA}} / 2) - 1$ | 1 MHz                             |
| $\pm (\text{BW}_{\text{Channel\_CA}} / 2)\text{-BW}_{\text{Channel\_CA}}$                                                                                                                                                                                                                                                                                                                                                                                                                                               | $-16 - (24 / \text{BW}_{\text{Channel\_CA}}) \left  \Delta f_{\text{OOB}} \right $                            |                                   |
| $< -\text{BW}_{\text{Channel\_CA}}$ OR $> \text{BW}_{\text{Channel\_CA}}$                                                                                                                                                                                                                                                                                                                                                                                                                                               | -40                                                                                                           |                                   |
| NOTE 1: Void                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                               |                                   |
| NOTE 2: Void                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                               |                                   |
| NOTE 3: The measured value shall be scaled by a factor equal to the ratio of the reference bandwidth (1 MHz) to the measurement bandwidth before the emission limit (dBr) is applied.                                                                                                                                                                                                                                                                                                                                   |                                                                                                               |                                   |
| NOTE 4: The carrier leakage exceptions from Table 6.4F.2.3-1 apply and carrier leakage contribution shall be removed prior to setting the 0dBr level of the mask, the reported carrier frequency location in <i>txDirectCurrentLocation</i> field of the <i>UplinkTxDirectCurrentBWP</i> can be used to cancel the carrier leakage contribution. If <i>txDirectCurrentLocation</i> is not available or is reported with value 3300 or 3301, a carrier frequency location at the center of the channel shall be assumed. |                                                                                                               |                                   |

For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2.

### 6.5F.2A.1.2.2 Intra-band contiguous CA spectrum emission mask for non-transmitted channels

In the case of non-transmitted 20 MHz channel(s) on the edges of an assigned aggregated channel bandwidth, the spectrum emission mask for operation with shared spectrum channel access specified in Table 6.5F.2A.1.2-1 is applied by using the total bandwidth of the remaining transmitted channels. The spectrum emission mask for non-transmitted channels is floored at -28dBr.

The relative power of any UE emission shall not exceed the most stringent levels given by the spectrum emission mask for operation with shared spectrum channel access with full aggregated channel bandwidth, and the spectrum emission mask for non-transmitted channels with the channel bandwidth of the transmitted channels in the case of non-transmitted channels at the edge of an assigned aggregated channel bandwidth.

An exception to the spectrum emission mask for non-transmitted channels allows a single [2] MHz bandwidth to extend to [-28] dBc relative to total transmit power, or [-20] dBm, whichever is the greatest.

## 6.5F.2A.2 Adjacent channel leakage ratio for CA

### 6.5F.2A.2.1 Adjacent channel leakage ratio for inter-band CA

For inter-band carrier aggregation with uplink assigned to two bands and including one of the bands listed in Table 6.2F.1-1, the ACLR requirements in clause 6.5.2.4 apply for the NR uplink carrier and clause 6.5F.2.4 for the carrier operating with shared spectrum access.

For combinations of intra-band and inter-band carrier aggregation with three uplink component carriers (up to two contiguously aggregated carriers per operating band and including one of the bands listed in Table 6.2F.1-1). For the NR band supporting two contiguous component carriers, the requirements in subclause 6.5A.2.4.1.1 apply. For the shared spectrum defined band supporting one component carrier, the requirements in subclause 6.5F.2.4.1 apply.

### 6.5F.2A.2.2 Adjacent channel leakage ratio for intra-band contiguous CA

For intra-band contiguous carrier aggregation, the Carrier Aggregation Adjacent Channel Leakage Power Ratio ( $CA_{ACLR}$ ) is the ratio of the filtered mean power centred on the aggregated channel bandwidth to the filtered mean power centred on an adjacent aggregated channel bandwidth at nominal channel spacing. The assigned aggregated channel bandwidth power and adjacent aggregated channel bandwidth power are measured with rectangular filters with measurement bandwidths specified in Table 6.5F.2A.2.2-1. If the measured adjacent channel power is greater than -47dBm then the ACLR shall be higher than the value specified in Table 6.5F.2A.2.2-1.

**Table 6.5F.2A.2.2-1: General requirements for intra-band contiguous CA ACLR power class 5**

|                                                                                                                                                                                                             | ACLR / Measurement bandwidth                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|
| CA ACLR                                                                                                                                                                                                     | 27 dB                                                            |
| CA Measurement bandwidth<br>(NOTE 1)                                                                                                                                                                        | Nominal channel space + $MBW_{ACLR,low}/2$ + $MBW_{ACLR,high}/2$ |
| Adjacent channel centre<br>frequency offset (in MHz)                                                                                                                                                        | $+ BW_{Channel\_CA}$<br>/<br>$- BW_{Channel\_CA}$                |
| Difference between ACLR MBW<br>center and $F_{c,low}$                                                                                                                                                       | $MBW_{shift} = (MBW_{ACLR\_CA} - MBW_{ACLR,low})/2$              |
| NOTE 1: $MBW_{ACLR,low}$ and $MBW_{ACLR,high}$ are the single-channel ACLR measurement bandwidths specified for channel bandwidths $BW_{channel(low)}$ and $BW_{channel(high)}$ in 6.5.2.4.1, respectively. |                                                                  |

## 6.5F.3 Spurious emissions

### 6.5F.3.0 General

Spurious emissions are emissions which are caused by unwanted transmitter effects such as harmonics emission, parasitic emissions, intermodulation products and frequency conversion products, but exclude out of band emissions unless otherwise stated. The spurious emission limits are specified in terms of general requirements in line with SM.329 [9] and NR operating band requirement to address UE co-existence.

To improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus  $MBW/2$ . The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus  $MBW/2$ .  $MBW$  denotes the measurement bandwidth defined for the protected band.

### 6.5F.3.1 General spurious emissions

The requirements for general spurious emission requirements in clause 6.5.3.1 apply.

### 6.5F.3.2 Spurious emissions for UE co-existence

Spurious emissions requirements for UE coexistence are not applicable to bands restricted to stand-alone operation with shared spectrum channel access as identified in Table 5.2-1.

### 6.5F.3.3 Additional spurious emissions

#### 6.5F.3.3.0 General

These requirements are specified in terms of an additional spectrum emission requirement. Additional spurious emission requirements are signalled by the network to indicate that the UE shall meet an additional requirement for a specific deployment scenario as part of the cell handover/broadcast message.

#### 6.5F.3.3.1 Requirement for network signalling value "NS\_28"

When "NS\_28" is indicated in the cell, the power of any UE emission for channels assigned within 5150-5350 and 5470-5725 MHz shall not exceed the levels specified in Table 6.5F.3.3.1-1. This requirement also applies for the frequency ranges that are less than  $F_{\text{OOB}}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

**Table 6.5F.3.3.1-1: Additional requirements**

| Frequency band (MHz)     | Channel bandwidth / Spectrum emission limit (dBm) | Measurement bandwidth |
|--------------------------|---------------------------------------------------|-----------------------|
|                          | 20, 40, 60, 80, [100] MHz                         |                       |
| $47 \leq f \leq 74$      | -54                                               | 100 kHz               |
| $87.5 \leq f \leq 118$   | -54                                               | 100 kHz               |
| $174 \leq f \leq 230$    | -54                                               | 100 kHz               |
| $470 \leq f \leq 862$    | -54                                               | 100 kHz               |
| $1000 \leq f \leq 5150$  | -30                                               | 1 MHz                 |
| $5350 \leq f \leq 5470$  | -30                                               | 1 MHz                 |
| $5725 \leq f \leq 26000$ | -30                                               | 1 MHz                 |

#### 6.5F.3.3.2 Requirement for network signalling value "NS\_29"

When "NS\_29" is indicated in the cell, the power of any UE emission for channels assigned within 5150-5350 and 5470-5730 MHz shall not exceed the levels specified in Table 6.5F.3.3.2-1, Table 6.5F.3.3.2-2, and Table 6.F.3.3.2-3. This requirement also applies for the frequency ranges that are less than  $F_{\text{OOB}}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

**Table 6.5F.3.3.2-1: Additional requirements for 20 MHz channel bandwidth**

| Center Frequency Fc [MHz]                                                                                                                                     | Protected range [MHz] | Minimum requirement [dBm] | Measurement bandwidth |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------------------|-----------------------|
| 5179.98 ≤ Fc ≤ 5239.98                                                                                                                                        | 5135 ≤ f ≤ 5142       | -26                       | 1 MHz                 |
|                                                                                                                                                               | 5142 < f ≤ 5150       | -18                       |                       |
|                                                                                                                                                               | 5250 ≤ f < 5250.2     | 3 to -2                   |                       |
|                                                                                                                                                               | 5250.2 ≤ f < 5251     | -2 to -10                 |                       |
|                                                                                                                                                               | 5251 ≤ f < 5260       | -10 to -18                |                       |
|                                                                                                                                                               | 5260 ≤ f < 5266.7     | -18 to -26                |                       |
|                                                                                                                                                               | 5266.7 ≤ f ≤ 5365     | -26                       |                       |
| 5260.02 ≤ Fc ≤ 5320.02                                                                                                                                        | 5135 ≤ f ≤ 5233.3     | -26                       |                       |
|                                                                                                                                                               | 5233.3 < f ≤ 5240     | -26 to -18                |                       |
|                                                                                                                                                               | 5240 < f ≤ 5249       | -18 to -10                |                       |
|                                                                                                                                                               | 5249 < f ≤ 5249.8     | -10 to -2                 |                       |
|                                                                                                                                                               | 5249.8 < f ≤ 5250     | -2 to 3                   |                       |
|                                                                                                                                                               | 5350 ≤ f ≤ 5365       | -26                       |                       |
| 5500.02 ≤ Fc ≤ 5719.98                                                                                                                                        | 5420 ≤ f ≤ 5460       | -26                       |                       |
|                                                                                                                                                               | 5460 < f ≤ 5470       | -19                       |                       |
|                                                                                                                                                               | 5745 ≤ f < 5765       | -19                       |                       |
|                                                                                                                                                               | 5765 ≤ f ≤ 5800       | -26                       |                       |
| NOTE: The minimum requirement when specified as a range denotes the emission requirement at the end points of the protected range. The requirement within the |                       |                           |                       |

protected range is obtained by linear interpolation between the requirements at the end points.

**Table 6.5F.3.3.2-2: Additional requirements for 40 MHz channel bandwidth**

| Center Frequency $F_c$ [MHz]                                                                                                                                                                                                                                  | Protected range [MHz]     | Minimum requirement [dBm] | Measurement bandwidth |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|---------------------------|-----------------------|
| $5190 \leq F_c \leq 5230.02$                                                                                                                                                                                                                                  | $5100 \leq f \leq 5141.6$ | -26                       | 1 MHz                 |
|                                                                                                                                                                                                                                                               | $5141.6 < f \leq 5150$    | -18                       |                       |
|                                                                                                                                                                                                                                                               | $5250 \leq f < 5251$      | -3 to -13                 |                       |
|                                                                                                                                                                                                                                                               | $5251 \leq f < 5270$      | -13 to -21                |                       |
|                                                                                                                                                                                                                                                               | $5270 \leq f < 5278.4$    | -21 to -26                |                       |
|                                                                                                                                                                                                                                                               | $5278.4 \leq f \leq 5400$ | -26                       |                       |
| $5269.98 \leq F_c \leq 5310$                                                                                                                                                                                                                                  | $5210 < f \leq 5221.6$    | -26                       |                       |
|                                                                                                                                                                                                                                                               | $5221.6 < f \leq 5230$    | -26 to -21                |                       |
|                                                                                                                                                                                                                                                               | $5230 < f \leq 5249$      | -21 to -13                |                       |
|                                                                                                                                                                                                                                                               | $5249 \leq f \leq 5250$   | -13 to -3                 |                       |
|                                                                                                                                                                                                                                                               | $5350 \leq f \leq 5358.4$ | -18                       |                       |
|                                                                                                                                                                                                                                                               | $5358.4 < f \leq 5400$    | -26                       |                       |
| $5509.98 \leq F_c \leq 5670$                                                                                                                                                                                                                                  | $5420 \leq f \leq 5460$   | -19                       |                       |
|                                                                                                                                                                                                                                                               | $5460 < f \leq 5470$      | -13                       |                       |
|                                                                                                                                                                                                                                                               | $5770 \leq f \leq 5800$   | -19                       |                       |
| NOTE: The minimum requirement when specified as a range denotes the emission requirement at the end points of the protected range. The requirement within the protected range is obtained by linear interpolation between the requirements at the end points. |                           |                           |                       |

**Table 6.5F.3.3.2-3: Additional requirements for 60 and 80 MHz channel bandwidth**

| Center Frequency $F_c$ [MHz]                                                                                                                                                                                                                                  | Protected range [MHz]     | Minimum requirement [dBm] | Measurement bandwidth |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|---------------------------|-----------------------|
| $5200.02 \leq F_c \leq 5220$                                                                                                                                                                                                                                  | $5020 \leq f \leq 5123.2$ | -26                       | 1 MHz                 |
|                                                                                                                                                                                                                                                               | $5123.2 < f \leq 5150$    | -18                       |                       |
|                                                                                                                                                                                                                                                               | $5250 \leq f < 5251$      | -6 to -16                 |                       |
|                                                                                                                                                                                                                                                               | $5251 \leq f < 5290$      | -16 to -24                |                       |
|                                                                                                                                                                                                                                                               | $5290 \leq f < 5296.7$    | -24 to -26                |                       |
|                                                                                                                                                                                                                                                               | $5296.7 \leq f \leq 5480$ | -26                       |                       |
| $5280 \leq F_c \leq 5299.98$                                                                                                                                                                                                                                  | $5020 \leq f \leq 5203.3$ | -26                       |                       |
|                                                                                                                                                                                                                                                               | $5203.3 < f \leq 5210$    | -26 to -24                |                       |
|                                                                                                                                                                                                                                                               | $5210 < f \leq 5249$      | -24 to -16                |                       |
|                                                                                                                                                                                                                                                               | $5249 < f \leq 5250$      | -16 to -6                 |                       |
|                                                                                                                                                                                                                                                               | $5350 \leq f < 5376.8$    | -18                       |                       |
|                                                                                                                                                                                                                                                               | $5376.8 \leq f \leq 5480$ | -26                       |                       |
| $5520 \leq F_c \leq 5689.98$                                                                                                                                                                                                                                  | $5340 \leq f \leq 5460$   | -19                       |                       |
|                                                                                                                                                                                                                                                               | $5460 < f \leq 5469.5$    | -13                       |                       |
|                                                                                                                                                                                                                                                               | $5469.5 < f \leq 5470$    | -13                       |                       |
|                                                                                                                                                                                                                                                               | $5770 \leq f \leq 5800$   | -19                       |                       |
| NOTE: The minimum requirement when specified as a range denotes the emission requirement at the end points of the protected range. The requirement within the protected range is obtained by linear interpolation between the requirements at the end points. |                           |                           |                       |

### 6.5F.3.3.3 Requirement for network signalling value "NS\_30"

When "NS\_30" is indicated in the cell, the power of any UE emission for channels assigned within 5150-5350 MHz, 5470-5725 MHz and 5725-5850 MHz shall not exceed the levels specified in Table 6.5F.3.3.3-1-1, Table 6.5F.3.3.3-1-2 and Table 6.5F.3.3.3-1-3, respectively. These requirements also apply for the frequency ranges that are less than  $F_{\text{OoB}}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

**Table 6.5F.3.3.3-1: Additional requirements for shared access channels assigned within 5150-5350 MHz**

| Protected range (MHz)   | Channel bandwidth / Spectrum emission limit (dBm) | Measurement bandwidth |
|-------------------------|---------------------------------------------------|-----------------------|
|                         | 20, 40, 60, 80 MHz                                |                       |
| $4500 \leq f \leq 5150$ | -41                                               | 1 MHz                 |
| $5350 \leq f \leq 5460$ | -41                                               |                       |

**Table 6.5F.3.3.3-2: Additional requirements for shared access channels assigned within 5470-5725 MHz**

| Protected range (MHz)   | Channel bandwidth / Spectrum emission limit (dBm) | Measurement bandwidth |
|-------------------------|---------------------------------------------------|-----------------------|
|                         | 20, 40, 60, 80 MHz                                |                       |
| $4500 \leq f \leq 5150$ | -41                                               | 1 MHz                 |
| $5350 \leq f \leq 5460$ | -41                                               |                       |
| $5460 < f \leq 5470$    | -27                                               |                       |
| $5725 \leq f$           | -27                                               |                       |

**Table 6.5F.3.3.3-3: Additional requirements for shared access channels assigned within 5725-5850 MHz**

| Protected range<br>(MHz)                                                                                                                                                                                                                                      | Channel bandwidth /<br>Spectrum emission limit<br>(dBm) | Measurement<br>bandwidth |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|--------------------------|
|                                                                                                                                                                                                                                                               | 20, 40, 60, 80, [100] MHz                               |                          |
| f < 5650                                                                                                                                                                                                                                                      | -27                                                     | 1 MHz                    |
| 5650 ≤ f < 5700                                                                                                                                                                                                                                               | -27 to 10                                               |                          |
| 5700 ≤ f < 5720                                                                                                                                                                                                                                               | 10 to 15.6                                              |                          |
| 5720 < f ≤ 5725                                                                                                                                                                                                                                               | 15.6 to 27                                              |                          |
| 5850 ≤ f ≤ 5855                                                                                                                                                                                                                                               | 27 to 15.6                                              |                          |
| 5855 < f ≤ 5875                                                                                                                                                                                                                                               | 15.6 to 10                                              |                          |
| 5875 < f ≤ 5925                                                                                                                                                                                                                                               | 10 to -27                                               |                          |
| 5925 < f                                                                                                                                                                                                                                                      | -27                                                     |                          |
| NOTE: The minimum requirement when specified as a range denotes the emission requirement at the end points of the protected range. The requirement within the protected range is obtained by linear interpolation between the requirements at the end points. |                                                         |                          |

### 6.5F.3.3.4 Requirement for network signalling value "NS\_31"

When "NS\_31" is indicated in the cell, the power of any UE emission for channels assigned within 5150-5250 MHz, 5250-5350 MHz, 5470-5725 MHz and 5725-5850 MHz shall not exceed the levels specified in Table 6.5F.3.3.4-1, Table 6.5F.3.3.4-2, Table 6.5F.3.3.4-3 and Table 6.5F.3.3.4-4, respectively. These requirements also apply for the frequency ranges that are less than  $F_{\text{OoB}}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

**Table 6.5F.3.3.4-1: Additional requirements for NR-U channels assigned within 5150-5250 MHz**

| Frequency band (MHz) | Channel bandwidth / Spectrum emission limit (dBm) | Measurement bandwidth |
|----------------------|---------------------------------------------------|-----------------------|
|----------------------|---------------------------------------------------|-----------------------|

|               | 20, 40, 60, 80 MHz |       |
|---------------|--------------------|-------|
| $f \leq 5150$ | -27                | 1 MHz |
| $f \geq 5250$ | -27                |       |

**Table 6.5F.3.3.4-2: Additional requirements for NR-U channels assigned within 5250-5350 MHz**

| Frequency band (MHz) | Channel bandwidth / Spectrum emission limit (dBm) | Measurement bandwidth |
|----------------------|---------------------------------------------------|-----------------------|
|                      | 20, 40, 60, 80 MHz                                |                       |
| $f \leq 5250$        | -27                                               | 1 MHz                 |
| $f \geq 5350$        | -27                                               |                       |

**Table 6.5F.3.3.4-3: Additional requirements for NR-U channels assigned within 5470-5725 MHz**

| Frequency band (MHz) | Channel bandwidth / Spectrum emission limit (dBm) | Measurement bandwidth |
|----------------------|---------------------------------------------------|-----------------------|
|                      | 20, 40, 60, 80 MHz                                |                       |
| $f \leq 5470$        | -27                                               | 1 MHz                 |
| $f \geq 5725$        | -27                                               |                       |

**Table 6.5F.3.3.4-4: Additional requirements for NR-U channels assigned within 5725-5850 MHz**

| Frequency band (MHz) | Channel bandwidth / Spectrum emission limit (dBm) | Measurement bandwidth |
|----------------------|---------------------------------------------------|-----------------------|
|                      | 20, 40, 60, 80 MHz                                |                       |
| $f \leq 5725$        | -27                                               | 1 MHz                 |
| $f \geq 5850$        | -27                                               |                       |
|                      |                                                   |                       |

**6.5F.3.3.5 Requirements for network signalling value "NS\_53" or "NS\_54" or "NS\_60"**

When "NS\_53" or "NS\_54" or "NS\_60" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5F.3.3.5-1. These requirements also apply for the frequency ranges that are less than  $F_{OoB}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

**Table 6.5F.3.3.5-1: Additional requirements**

| Frequency band (MHz) | Spectrum emission limit (dBm) | Measurement bandwidth |
|----------------------|-------------------------------|-----------------------|
| $f \leq 5925$        | -27                           | 1 MHz                 |
| $f \geq 7125$        | -27                           |                       |

**6.5F.3.3.6 Requirements for network signalling value "NS\_58"**

When "NS\_58" is indicated in the cell, the power of any UE emission for channels assigned within 5945-6425 MHz shall not exceed the levels specified in Table 6.5F.3.3.6-1. These requirements also apply for frequency ranges that are less than  $F_{OoB}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

**Table 6.5F.3.3.6-1: Additional requirements**

| Frequency band (MHz)   | Channel bandwidth / Spectrum emission limit (dBm) | Measurement bandwidth |
|------------------------|---------------------------------------------------|-----------------------|
| $87.5 \leq f \leq 118$ | -54                                               | 100 kHz               |
| $174 \leq f \leq 230$  | -54                                               | 100 kHz               |
| $470 \leq f \leq 694$  | -54                                               | 100 kHz               |

|               |     |       |
|---------------|-----|-------|
| $f \leq 5935$ | -22 | 1 MHz |
|---------------|-----|-------|

6.5F.3.3.7 Requirements for network signalling value "NS\_61"

When "NS\_61" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5F.3.3.7-1. These requirements also apply for the frequency ranges that are less than  $F_{\text{OOB}}$  (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

Table 6.5F.3.3.7-1: Additional requirements

| Frequency band (MHz) | Channel bandwidth / Spectrum emission limit (dBm) | Measurement bandwidth |
|----------------------|---------------------------------------------------|-----------------------|
| $f \leq 5925$        | -34                                               | 1 MHz                 |
| $f \geq 6445$        | -34                                               |                       |

6.5F.4 Transmit intermodulation

The requirements for transmit intermodulation in clause 6.5F.4 apply.

6.5G Output RF spectrum emissions for Tx Diversity

6.5G.1 Occupied bandwidth for Tx Diversity

For UE supporting Tx diversity, the requirements for occupied bandwidth apply to the transmitted spectrum as measured as the sum of the power from all UE transmit antenna connectors. The occupied bandwidth is defined as the bandwidth containing 99 % of the total integrated mean power of the transmitted spectrum on the assigned channel at each transmit antenna connector.

6.5G.2 Out of band emission for Tx Diversity

For UE supporting Tx diversity, the requirements for Out of band emissions resulting from the modulation process and non-linearity in the transmitters apply to the sum of the emissions from all UE transmit antenna connectors.

If UE indicates IE *txDiversity-r16*, Adjacent Channel Leakage power Ratio (ACLR) is defined as the ratio of sum of the filtered mean power at each antenna connector centred on the assigned channel frequency to sum of the filtered mean power at each antenna connector centred on an adjacent channel frequency.

The requirements specified in clause 6.5.2 apply.

6.5G.3 Spurious emission for Tx Diversity

For UE supporting Tx diversity, the requirements for Spurious emissions which are caused by unwanted transmitter effects such as harmonics emission, parasitic emissions, intermodulation products and frequency conversion products apply to the sum of the emissions from all UE transmit antenna connectors.

The requirements specified in clause 6.5.3 apply.

6.5G.4 Transmit intermodulation for Tx Diversity

For UE supporting Tx diversity, the transmit intermodulation requirements are specified at each transmit antenna connector and the wanted signal is defined as the sum of output power from all UE transmit antenna connectors.

The requirements specified in clause 6.5.4 apply.

## 6.5H Output RF spectrum emissions for CA with UL MIMO

### 6.5H.1 Output RF spectrum emissions for intra-band UL contiguous CA with UL MIMO

#### 6.5H.1.1 Occupied bandwidth for intra-band UL contiguous CA with UL MIMO

For UE supporting intra-band UL contiguous CA and UL MIMO, the requirements for occupied bandwidth specified in clause 6.5A.1.1a apply to the sum of the powers from both UE transmit antenna connectors and all UL CCs. The requirements shall be met with UL MIMO configurations described in Table 6.2D.1-2.

If UE is scheduled for single antenna-port PUSCH transmission by DCI format 0\_0 or by DCI format 0\_1 for single antenna port codebook based transmission with precoding matrix  $W=1$  [6.3.1.5 TS 38.211], the requirements in clause 6.5A.1.1a apply.

#### 6.5H.1.2 Out of band emission for intra-band UL contiguous CA with UL MIMO

For UE supporting intra-band UL contiguous CA and UL MIMO, the requirements for Out of band emissions resulting from the modulation process and non-linearity in the transmitters is defined as the sum of the emissions from both UE transmit antenna connectors and all UL CCs, the requirements in subclause 6.5A.2.2.1, 6.5A.2.3.1 and 6.5A.2.4.1.1 apply. The requirements shall be met with UL MIMO configurations described in Table 6.2D.1-2.

If UE is scheduled for single antenna-port PUSCH transmission by DCI format 0\_0 or by DCI format 0\_1 for single antenna port codebook based transmission with precoding matrix  $W=1$  [6.3.1.5 TS 38.211], the requirements in clause 6.5A.2.2.1, 6.5A.2.3.1 and 6.5A.2.4.1.1 apply.

#### 6.5H.1.3 Spurious emission for intra-band UL contiguous CA with UL MIMO

For UE supporting intra-band UL contiguous CA and UL MIMO, the requirements for Spurious emissions is defined as the sum of the emissions from both UE transmit antenna connectors and all UL CCs, the requirements specified in subclause 6.5A.3.1, 6.5A.3.2.1 and 6.5A.3.3.1 apply. The requirements shall be met with the UL MIMO configurations described in Table 6.2D.1-2.

If UE is scheduled for single antenna-port PUSCH transmission by DCI format 0\_0 or by DCI format 0\_1 for single antenna port codebook based transmission with precoding matrix  $W=1$  [6.3.1.5 TS 38.211], the requirements in clause 6.5A.3.1, 6.5A.3.2.1 and 6.5A.3.3.1 apply.

#### 6.5H.1.4 Transmit intermodulation for intra-band UL contiguous CA with UL MIMO

For UE supporting intra-band UL contiguous CA and UL MIMO, the transmit intermodulation requirements are specified at each transmit antenna connector and the wanted signal is defined as the sum of output powers from both UE transmit antenna connectors, the requirements specified in clause 6.5A.4.2.1 apply. The requirements shall be met with the UL MIMO configurations described in Table 6.2D.1-2.

If UE is scheduled for single antenna-port PUSCH transmission by DCI format 0\_0 or by DCI format 0\_1 for single antenna port codebook based transmission with precoding matrix  $W=1$  [6.3.1.5 TS 38.211], the requirements in clause 6.5A.4.2.1 apply.

## 6.6 Void

### 6.6E Time alignment error

For V2X UE(s) with two transmit antenna connectors in SL MIMO, this requirement applies to slot timing differences between transmissions on two transmit antenna connectors. The Time Alignment Error (TAE) shall not exceed 260 ns.



## 7 Receiver characteristics

### 7.1 General

Unless otherwise stated the receiver characteristics are specified at the antenna connector(s) of the UE. For UE(s) with an integral antenna only, a reference antenna(s) with a gain of 0 dBi is assumed for each antenna port(s). UE with an integral antenna(s) may be taken into account by converting these power levels into field strength requirements, assuming a 0 dBi gain antenna. For UEs with more than one receiver antenna connector, identical interfering signals shall be applied to each receiver antenna port if more than one of these is used (diversity).

The levels of the test signal applied to each of the antenna connectors shall be as defined in the respective clauses below.

The applicability of receiver requirements for Band n90 is in accordance with that for Band n41; a UE supporting Band n90 shall meet the minimum requirements for Band n41.

With the exception of clause 7.3, the requirements shall be verified with the network signalling value NS\_01 configured (Table 6.2.3-1).

All the parameters in clause 7 are defined using the UL reference measurement channels specified in Annex A.2.2, the DL reference measurement channels specified in Annex A.3.2 and using the set-up specified in Annex C.3.1.

The minimum requirements specified in clauses 7.5, 7.6, 7.7 and 7.8 for NR band n48 refer to the minimum requirements for NR bands < 2.7 GHz.

For the additional requirements for intra-band non-contiguous carrier aggregation of two or more sub-blocks, an in-gap test refers to the case when the interfering signal is located at a negative offset with respect to the assigned lowest channel frequency of the highest sub-block and located at a positive offset with respect to the assigned highest channel frequency of the lowest sub-block.

For the additional requirements for intra-band non-contiguous carrier aggregation of two or more sub-blocks, an out-of-gap test refers to the case when the interfering signal(s) is (are) located at a positive offset with respect to the assigned channel frequency of the highest carrier frequency, or located at a negative offset with respect to the assigned channel frequency of the lowest carrier frequency.

For the additional requirements for intra-band non-contiguous carrier aggregation of two or more sub-blocks with channel bandwidth larger than or equal to 5 MHz, the existing adjacent channel selectivity requirements, in-band blocking requirements (for each case), and narrow band blocking requirements apply for in-gap tests only if the corresponding interferer frequency offsets with respect to the two measured carriers satisfy the following condition in relation to the sub-block gap size  $W_{\text{gap}}$  for at least one of these carriers  $j = 1, 2$ , so that the interferer frequency position does not change the nature of the core requirement tested:

$$W_{\text{gap}} \geq 2 \cdot |F_{\text{Interferer (offset)}_j}| - BW_{\text{Channel}(j)}$$

where  $F_{\text{Interferer (offset)}_j}$  for a sub-block with a single component carrier is the interferer frequency offset with respect to carrier  $j$  as specified in clause 7.5, clause 7.6.2 and clause 7.6.4 for the respective requirement and  $BW_{\text{Channel}(j)}$  the channel bandwidth of carrier  $j$ .  $F_{\text{Interferer (offset)}_j}$  for a sub-block with two or more contiguous component carriers is the interference frequency offset with respect to the carrier adjacent to the gap is specified in clause 7.5A, 7.6A.2 and 7.6A.3. The interferer frequency offsets for adjacent channel selectivity, each in-band blocking case and narrow-band blocking shall be tested separately with a single in-gap interferer at a time.

For the additional requirements for operation with shared spectrum channel access, the receiver requirements apply under the assumption that all 20 MHz sub-bands and all RB's of each sub-band within the downlink channel are allocated with intra-cell guard bands configured to zero.

#### 7.1A General

The minimum requirements for band combinations including Band n41 also apply for the corresponding band combinations with Band n90 replacing Band n41 but with otherwise identical parameters. For brevity the said band combinations with Band n90 are not listed in the tables below but are covered by this specification.

The minimum requirements specified in clauses 7.5A, 7.6A, 7.7A and 7.8A for NR band n48 refer to the minimum requirements for NR bands < 2.7 GHz.

## 7.1F General

For wideband operations, the minimum requirements for the receiver characteristics are specified when zero width intra-cell guardbands are configured and with all RB set(s) within the channel scheduled and with all RB sets available for DL transmissions according to the channel access procedures in [14].

Unless stated otherwise, when a clause is not present for shared spectrum channel access, the general requirements and the additional clause requirements (suffices A,B,D) in clause 7 apply.

## 7.1I General

For a Redcap UE the requirements in Section 7 shall be verified with the channel bandwidth up to 20MHz and REFSSENS specified in clause 7.3I.

## 7.2 Diversity characteristics

The UE is required to be equipped with a minimum of two Rx antenna ports in all operating bands except for the bands n7, n38, n41, n48, n77, n78, n79, n104 where the UE is required to be equipped with a minimum of four Rx antenna ports. This requirement applies when the band is used as a standalone band or as part of a band combination.

For the single carrier REFSSENS requirements in Clause 7, the UE shall be verified with two Rx antenna ports in all supported frequency bands, additional requirements for four Rx ports shall be verified in operating bands where the UE is equipped with four Rx antenna ports.

For Rx requirements other than single carrier REFSSENS in Clause 7, the UE shall be verified with four Rx antenna ports and skip two Rx antenna ports requirements in operating bands where the UE is equipped with four Rx antenna ports, otherwise, the UE shall be verified with two Rx antenna ports.

The above rules apply for all clauses with the exception of clause 7.9.

A Redcap UE is required to be equipped with a minimum of single Rx antenna port and maximum of two Rx antenna ports. Clause 7 requirements for four Rx antenna ports do not apply to a RedCap UE.

## 7.3 Reference sensitivity

### 7.3.1 General

The reference sensitivity power level REFSSENS is the minimum mean power applied to each one of the UE antenna ports for all UE categories, at which the throughput shall meet or exceed the requirements for the specified reference measurement channel.

In later clauses of Clause 7 where the value of REFSSENS is used as a reference to set the corresponding requirement:

- when the UE is verified with 2 Rx antenna ports, it shall be verified against those requirements by applying the REFSSENS value in Table 7.3.2-1a, Table 7.3.2-1b and Table 7.3.2-1c or Table 7.3.2-1d with 2 Rx antenna ports tested;
- when the UE is verified with 4 Rx antenna ports, it shall be verified against those requirements by applying the resulting REFSSENS value derived from the requirement in Table 7.3.2-2 with 4 Rx antenna ports tested.

### 7.3.2 Reference sensitivity power level

The throughput shall be  $\geq 95$  % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2.2, A3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as

described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3.2-1a, Table 7.3.2-1b, Table 7.3.2-1c, Table 7.3.2-1d and Table 7.3.2-2.

**Table 7.3.2-1a: Two antenna port reference sensitivity QPSK PREFSENS for FDD bands**

| Operating band / SCS / Channel bandwidth |         |                    |                    |                    |                    |              |              |              |              |              |              |
|------------------------------------------|---------|--------------------|--------------------|--------------------|--------------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Operating Band                           | SCS kHz | 5 MHz (dBm)        | 10 MHz (dBm)       | 15 MHz (dBm)       | 20 MHz (dBm)       | 25 MHz (dBm) | 30 MHz (dBm) | 35 MHz (dBm) | 40 MHz (dBm) | 45 MHz (dBm) | 50 MHz (dBm) |
| n1                                       | 15      | -100.0             | -96.8              | -95.0              | -93.8              | -92.7        | -91.9        |              | -90.6        | -90.1        | -89.6        |
|                                          | 30      |                    | -97.1              | -95.1              | -94.0              | -92.8        | -92.0        |              | -90.7        | -90.2        | -89.7        |
|                                          | 60      |                    | -97.5              | -95.4              | -94.2              | -93.0        | -92.1        |              | -90.9        | -90.3        | -89.7        |
| n2                                       | 15      | -98                | -94.8              | -93                | -91.8              | -90.7        | -84.1        | -83.6        | -81.5        |              |              |
|                                          | 30      |                    | -95.1              | -93.1              | -92                | -90.8        | -84.2        | -83.7        | -81.6        |              |              |
|                                          | 60      |                    | -95.5              | -93.4              | -92.2              | -90.9        | -84.3        | -83.8        | -81.7        |              |              |
| n3                                       | 15      | -97.0              | -93.8              | -92.0              | -90.8              | -89.7        | -88.9        | -86.2        | -82.3        | -81.3        | -79.7        |
|                                          | 30      |                    | -94.1              | -92.1              | -91.0              | -89.8        | -89.0        | -86.3        | -82.4        | -81.4        | -79.8        |
|                                          | 60      |                    | -94.5              | -92.4              | -91.2              | -90.0        | -89.1        | -86.4        | -82.6        | -81.5        | -79.9        |
| n5                                       | 15      | -98.0              | -94.8              | -93.0              | -86.8              | -84.8        |              |              |              |              |              |
|                                          | 30      |                    | -95.1              | -93.1              | -88.6              | -84.9        |              |              |              |              |              |
| n7 <sup>1</sup>                          | 15      | -98.0              | -94.8              | -93.0              | -91.8              | -90.7        | -89.9        | -89.2        | -88.6        |              | -81.5        |
|                                          | 30      |                    | -95.1              | -93.1              | -92.0              | -90.8        | -90.0        | -89.3        | -88.7        |              | -81.5        |
|                                          | 60      |                    | -95.5              | -93.4              | -92.2              | -91.0        | -90.1        | -89.4        | -88.9        |              | -81.5        |
| n8                                       | 15      | -97.0              | -93.8              | -91.4              | -85.8              |              |              | -78.4        |              |              |              |
|                                          | 30      |                    | -94.1              | -91.7              | -87.2              |              |              | -78.5        |              |              |              |
| n12                                      | 15      | -97.0              | -93.8              | -84.0              |                    |              |              |              |              |              |              |
|                                          | 30      |                    | -94.1              | -84.1              |                    |              |              |              |              |              |              |
| n13                                      | 15      | -97.0              | -93.8              |                    |                    |              |              |              |              |              |              |
|                                          | 30      |                    | -94.1              |                    |                    |              |              |              |              |              |              |
| n14                                      | 15      | -97.0              | -93.8              |                    |                    |              |              |              |              |              |              |
|                                          | 30      |                    | -94.1              |                    |                    |              |              |              |              |              |              |
| n18                                      | 15      | -100.0             | -96.8              | -95.0              |                    |              |              |              |              |              |              |
|                                          | 30      |                    | -97.1              | -95.1              |                    |              |              |              |              |              |              |
| n20                                      | 15      | -97.0              | -93.8              | -91.0              | -89.8              |              |              |              |              |              |              |
|                                          | 30      |                    | -94.1              | -91.1              | -90.0              |              |              |              |              |              |              |
| n24                                      | 15      | -100.0             | -96.8              |                    |                    |              |              |              |              |              |              |
|                                          | 30      |                    | -97.1              |                    |                    |              |              |              |              |              |              |
|                                          | 60      |                    | -97.5              |                    |                    |              |              |              |              |              |              |
| n25                                      | 15      | -96.5              | -93.3              | -91.5              | -90.3              | -89.3        | -82.2        | -81.7        | -79.5        | -77.6        |              |
|                                          | 30      |                    | -93.6              | -91.6              | -90.5              | -89.4        | -82.3        | -81.8        | -79.6        | -77.7        |              |
|                                          | 60      |                    | -94.0              | -91.9              | -90.7              | -89.6        | -82.4        | -81.9        | -79.7        | -77.8        |              |
| n26                                      | 15      | -97.5 <sup>6</sup> | -94.5 <sup>6</sup> | -92.7 <sup>6</sup> | -87.6              | -84.5        | -81.7        |              |              |              |              |
|                                          | 30      |                    | -94.8 <sup>6</sup> | -92.7 <sup>6</sup> | -87.7              | -84.6        | -81.8        |              |              |              |              |
| n28                                      | 15      | -98.5              | -95.5              | -93.5              | -90.8              | -84.2        | -78.5        |              |              |              |              |
|                                          | 30      |                    | -95.6              | -93.6              | -91.0              | -84.2        | -78.6        |              |              |              |              |
| n30                                      | 15      | -99.0              | -95.8              |                    |                    |              |              |              |              |              |              |
|                                          | 30      |                    | -96.1              |                    |                    |              |              |              |              |              |              |
| n65                                      | 15      | -99.5              | -96.3              | -94.5              | -93.3              |              |              |              |              |              | -89.2        |
|                                          | 30      |                    | -96.6              | -94.6              | -93.5              |              |              |              |              |              | -89.3        |
|                                          | 60      |                    | -97.0              | -94.9              | -93.7              |              |              |              |              |              | -89.4        |
| n66                                      | 15      | -99.5              | -96.3              | -94.5              | -93.3              | -92.2        | -91.4        | -90.7        | -90.1        | -89.6        |              |
|                                          | 30      |                    | -96.6              | -94.6              | -93.5              | -92.3        | -91.5        | -90.8        | -90.2        | -89.7        |              |
|                                          | 60      |                    | -97.0              | -94.9              | -93.7              | -92.5        | -91.6        | -90.9        | -90.4        | -89.8        |              |
| n70                                      | 15      | -100.0             | -96.8              | -95.0              | -93.8              | -92.7        |              |              |              |              |              |
|                                          | 30      |                    | -97.1              | -95.1              | -94.0              | -92.8        |              |              |              |              |              |
|                                          | 60      |                    | -97.5              | -95.4              | -94.2              | -93.0        |              |              |              |              |              |
| n71                                      | 15      | -97.2              | -94.0              | -91.6              | -86.0              | -84.1        | -82.5        | -80.7        |              |              |              |
|                                          | 30      |                    | -94.3              | -91.9              | -87.4              | -84.2        | -82.6        | -80.8        |              |              |              |
| n74                                      | 15      | -99.5 <sup>3</sup> | -96.3 <sup>3</sup> | -94.5 <sup>3</sup> | -89.3 <sup>3</sup> |              |              |              |              |              |              |
|                                          | 30      |                    | -96.6 <sup>3</sup> | -94.6 <sup>3</sup> | -89.5 <sup>3</sup> |              |              |              |              |              |              |
|                                          | 60      |                    | -97.0 <sup>3</sup> | -94.9 <sup>3</sup> | -89.6 <sup>3</sup> |              |              |              |              |              |              |
| n85                                      | 15      | -97.0              | -93.8              | -84.0              |                    |              |              |              |              |              |              |
|                                          | 30      |                    | -94.1              | -84.1              |                    |              |              |              |              |              |              |

| Operating band / SCS / Channel bandwidth                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |         |             |              |              |              |              |              |              |              |              |              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Operating Band                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | SCS kHz | 5 MHz (dBm) | 10 MHz (dBm) | 15 MHz (dBm) | 20 MHz (dBm) | 25 MHz (dBm) | 30 MHz (dBm) | 35 MHz (dBm) | 40 MHz (dBm) | 45 MHz (dBm) | 50 MHz (dBm) |
| n100                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 15      | -100        |              |              |              |              |              |              |              |              |              |
| NOTE 1: Four Rx antenna ports shall be the baseline for this operating band except for two Rx vehicular UE. Four Rx antenna ports for RedCap UE is not supported for this operating band.<br>NOTE 2: The transmitter shall be set to $P_{\text{UMAX}}$ as defined in clause 6.2.4<br>NOTE 3: The requirement is modified by -0.5 dB when the assigned NR channel bandwidth is confined within 1475.9 - 1510.9 MHz.<br>NOTE 4: Void<br>NOTE 5: Void<br>NOTE 6: Values are modified by -0.5dB when carrier channel BW is between 865MHz and 894MHz.<br>NOTE 7: Void. |         |             |              |              |              |              |              |              |              |              |              |

**Table 7.3.2-1b: Two antenna port reference sensitivity QPSK  $P_{\text{REFSENS}}$  for TDD, SDL and FDD with variable duplex operation bands**

| Operating band / SCS / Channel bandwidth / REFSSENS |         |                                                                                                                                |                                         |             |
|-----------------------------------------------------|---------|--------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-------------|
| Operating band                                      | SCS kHz | Channel bandwidth (MHz)                                                                                                        | REFSENS (dBm) <sup>8</sup>              | Duplex Mode |
| n29 <sup>7</sup>                                    | 15      | 5, 10                                                                                                                          | $-97 + 10\log_{10}(N_{\text{RB}}/25)$   | SDL         |
|                                                     | 30      | 10                                                                                                                             | $-94.1 + 10\log_{10}(N_{\text{RB}}/24)$ |             |
| n34                                                 | 15      | 5, 10, 15                                                                                                                      | $-100 + 10\log_{10}(N_{\text{RB}}/25)$  | TDD         |
|                                                     | 30      | 10, 15                                                                                                                         | $-97.1 + 10\log_{10}(N_{\text{RB}}/24)$ |             |
|                                                     | 60      | 10, 15                                                                                                                         | $-97.5 + 10\log_{10}(N_{\text{RB}}/11)$ |             |
| n38 <sup>1</sup>                                    | 15      | 5, 10, 15, 20, 25, 30, 40                                                                                                      | $-100 + 10\log_{10}(N_{\text{RB}}/25)$  | TDD         |
|                                                     | 30      | 10, 15, 20, 25, 30, 40                                                                                                         | $-97.1 + 10\log_{10}(N_{\text{RB}}/24)$ |             |
|                                                     | 60      | 10, 15, 20, 25, 30, 40                                                                                                         | $-97.5 + 10\log_{10}(N_{\text{RB}}/11)$ |             |
| n39                                                 | 15      | 5, 10, 15, 20, 25, 30, 40                                                                                                      | $-100 + 10\log_{10}(N_{\text{RB}}/25)$  | TDD         |
|                                                     | 30      | 10, 15, 20, 25, 30, 40                                                                                                         | $-97.1 + 10\log_{10}(N_{\text{RB}}/24)$ |             |
|                                                     | 60      | 10, 15, 20, 25, 30, 40                                                                                                         | $-97.5 + 10\log_{10}(N_{\text{RB}}/11)$ |             |
| n40                                                 | 15      | 5, 10, 15, 20, 25, 30, 40, 50                                                                                                  | $-100 + 10\log_{10}(N_{\text{RB}}/25)$  | TDD         |
|                                                     | 30      | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                | $-97.1 + 10\log_{10}(N_{\text{RB}}/24)$ |             |
|                                                     | 60      | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                | $-97.5 + 10\log_{10}(N_{\text{RB}}/11)$ |             |
| n41 <sup>1</sup> , n90 <sup>1</sup>                 | 15      | 5 <sup>9</sup> , 10, 15, 20, 25, 30, 35, 40, 45, 50                                                                            | $-94.8 + 10\log_{10}(N_{\text{RB}}/52)$ | TDD         |
|                                                     | 30      | 10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100                                                                        | $-95.1 + 10\log_{10}(N_{\text{RB}}/24)$ |             |
|                                                     | 60      | 10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100                                                                        | $-95.5 + 10\log_{10}(N_{\text{RB}}/11)$ |             |
| n48 <sup>1</sup>                                    | 15      | 5, 10, 15, 20, 30, 40, 50 <sup>5</sup>                                                                                         | $-99 + 10\log_{10}(N_{\text{RB}}/25)$   | TDD         |
|                                                     | 30      | 10, 15, 20, 30, 40, 50 <sup>5</sup> , 60 <sup>5</sup> , 70 <sup>5</sup> , 80 <sup>5</sup> , 90 <sup>5</sup> , 100 <sup>5</sup> | $-96.1 + 10\log_{10}(N_{\text{RB}}/24)$ |             |
|                                                     | 60      | 10, 15, 20, 30, 40, 50 <sup>5</sup> , 60 <sup>5</sup> , 70 <sup>5</sup> , 80 <sup>5</sup> , 90 <sup>5</sup> , 100 <sup>5</sup> | $-96.5 + 10\log_{10}(N_{\text{RB}}/11)$ |             |
| n50                                                 | 15      | 5, 10, 15, 20, 30, 40, 50                                                                                                      | $-100 + 10\log_{10}(N_{\text{RB}}/25)$  | TDD         |
|                                                     | 30      | 10, 15, 20, 30, 40, 50, 60, 80                                                                                                 | $-97.1 + 10\log_{10}(N_{\text{RB}}/24)$ |             |
|                                                     | 60      | 10, 15, 20, 30, 40, 50, 60, 80                                                                                                 | $-97.5 + 10\log_{10}(N_{\text{RB}}/11)$ |             |
| n51                                                 | 15      | 5                                                                                                                              | -100                                    | TDD         |
| n53                                                 | 15      | 5, 10                                                                                                                          | $-100 + 10\log_{10}(N_{\text{RB}}/25)$  | TDD         |
|                                                     | 30      | 10                                                                                                                             | -97.1                                   |             |
|                                                     | 60      | 10                                                                                                                             | -97.5                                   |             |
| n67 <sup>7</sup>                                    | 15      | 5, 10, 15, 20                                                                                                                  | $-100 + 10\log_{10}(N_{\text{RB}}/25)$  | SDL         |
|                                                     | 30      | 10, 15, 20                                                                                                                     | $-97.1 + 10\log_{10}(N_{\text{RB}}/24)$ |             |
| n75 <sup>7</sup>                                    | 15      | 5, 10, 15, 20, 25, 30, 40, 50                                                                                                  | $-100 + 10\log_{10}(N_{\text{RB}}/25)$  | SDL         |
|                                                     | 30      | 10, 15, 20, 25, 30, 40, 50                                                                                                     | $-97.1 + 10\log_{10}(N_{\text{RB}}/24)$ |             |
|                                                     | 60      | 10, 15, 20, 25, 30, 40, 50                                                                                                     | $-97.5 + 10\log_{10}(N_{\text{RB}}/11)$ |             |
| n76 <sup>7</sup>                                    | 15      | 5                                                                                                                              | $-95.3 + 10\log_{10}(N_{\text{RB}}/52)$ | SDL         |
| n77 <sup>1,4</sup>                                  | 15      | 10, 15, 20, 25, 30, 40, 50                                                                                                     | $-95.3 + 10\log_{10}(N_{\text{RB}}/52)$ | TDD         |
|                                                     | 30      | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                | $-95.6 + 10\log_{10}(N_{\text{RB}}/24)$ |             |
|                                                     | 60      | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                | $-96.0 + 10\log_{10}(N_{\text{RB}}/11)$ |             |
| n78 <sup>1</sup>                                    | 15      | 10, 15, 20, 25, 30, 40, 50                                                                                                     | $-95.8 + 10\log_{10}(N_{\text{RB}}/52)$ | TDD         |
|                                                     | 30      | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                | $-96.1 + 10\log_{10}(N_{\text{RB}}/24)$ |             |
|                                                     | 60      | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100                                                                                | $-96.5 + 10\log_{10}(N_{\text{RB}}/11)$ |             |
| n79 <sup>1</sup>                                    | 15      | 10, 20, 30, 40, 50                                                                                                             | $-95.8 + 10\log_{10}(N_{\text{RB}}/52)$ | TDD         |

| Operating band / SCS / Channel bandwidth / REFSSENS                                                                                                                                                            |         |                                         |                                                    |             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-----------------------------------------|----------------------------------------------------|-------------|
| Operating band                                                                                                                                                                                                 | SCS kHz | Channel bandwidth (MHz)                 | REFSENS (dBm) <sup>8</sup>                         | Duplex Mode |
|                                                                                                                                                                                                                | 30      | 10, 20, 30, 40, 50, 60, 70, 80, 90, 100 | -96.1 + 10log <sub>10</sub> (N <sub>RB</sub> /24)  |             |
|                                                                                                                                                                                                                | 60      | 10, 20, 30, 40, 50, 60, 70, 80, 90, 100 | -96.5 + 10log <sub>10</sub> (N <sub>RB</sub> /11)  |             |
| n91                                                                                                                                                                                                            | 15      | 5                                       | -100                                               | FDD         |
| n92                                                                                                                                                                                                            | 15      | 5,10,15,20                              | -100 + 10log <sub>10</sub> (N <sub>RB</sub> /25)   | FDD         |
|                                                                                                                                                                                                                | 30      | 10,15,20                                | -97.1 + 10log <sub>10</sub> (N <sub>RB</sub> /24)  |             |
| n93                                                                                                                                                                                                            | 15      | 5                                       | -100                                               | FDD         |
| n94                                                                                                                                                                                                            | 15      | 5,10,15,20                              | -100 + 10log <sub>10</sub> (N <sub>RB</sub> /25)   | FDD         |
|                                                                                                                                                                                                                | 30      | 10,15,20                                | -97.1 + 10log <sub>10</sub> (N <sub>RB</sub> /24)  |             |
| n101                                                                                                                                                                                                           | 15      | 5, 10                                   | -100 + 10log <sub>10</sub> (N <sub>RB</sub> /25)   | TDD         |
|                                                                                                                                                                                                                | 30      | 10                                      | -97.1 + 10log <sub>10</sub> (N <sub>RB</sub> /24)  |             |
| n104 <sup>1,10</sup>                                                                                                                                                                                           | 15      | 20, 30, 40, 50                          | -90.7 + 10log <sub>10</sub> (N <sub>RB</sub> /106) | TDD         |
|                                                                                                                                                                                                                | 30      | 20, 30, 40, 50, 60, 70, 80, 90, 100     | -90.8 + 10log <sub>10</sub> (N <sub>RB</sub> /51)  |             |
|                                                                                                                                                                                                                | 60      | 20, 30, 40, 50, 60, 70, 80, 90, 100     | -91.1 + 10log <sub>10</sub> (N <sub>RB</sub> /24)  |             |
| NOTE 1: Four Rx antenna ports shall be the baseline for this operating band except for two Rx vehicular UE. Four Rx antenna ports for RedCap UE is not supported for this operating band.                      |         |                                         |                                                    |             |
| NOTE 2: The transmitter shall be set to P <sub>UMAX</sub> as defined in clause 6.2.4.                                                                                                                          |         |                                         |                                                    |             |
| NOTE 3: Void                                                                                                                                                                                                   |         |                                         |                                                    |             |
| NOTE 4: The requirement is modified by -0.5 dB when the assigned UE channel bandwidth is confined within 3300 - 3800 MHz.                                                                                      |         |                                         |                                                    |             |
| NOTE 5: For these bandwidths, the minimum requirements are restricted to operation when carrier is configured as a downlink carrier part of CA configuration.                                                  |         |                                         |                                                    |             |
| NOTE 6: Void                                                                                                                                                                                                   |         |                                         |                                                    |             |
| NOTE 7: For SDL bands, the reference sensitivity requirements shall be verified by inter-band CA combinations with SDL band, which are supported by UE.                                                        |         |                                         |                                                    |             |
| NOTE 8: The REFSSENS value is rounded to the nearest number down to one decimal point. "N <sub>RB</sub> " in REFSSENS formula is the maximum transmission bandwidth configuration as defined in Table 5.3.2-1. |         |                                         |                                                    |             |
| Void.                                                                                                                                                                                                          |         |                                         |                                                    |             |
| NOTE 10: A UE may implement two RX antenna ports for band n104 when conditions are met. The exact conditions are FFS.                                                                                          |         |                                         |                                                    |             |

For power class 2 UEs, certain degradation of the reference sensitivity in Table 7.3.2-1a is allowed. The maximum amount of degradation is specified in Table 7.3.2-1c, and in Table 7.3.2-1d for a UE that indicates *txDiversity-r16* or *txDiversity2Tx-r18* [15].

**Table 7.3.2-1c Reference Sensitivity Degradation from PC3 to PC2 for FDD bands for UE not supporting Tx Diversity**

| Operating Band                                                                | 5 MHz (dB) | 10 MHz (dB) | 15 MHz (dB) | 20 MHz (dB) | 25 MHz (dB) | 30 MHz (dB) | 35 MHz (dB) | 40 MHz (dB) | 45 MHz (dB) | 50 MHz (dB) |
|-------------------------------------------------------------------------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| n1                                                                            | 0          | 0           | 0           | 0           | 0           | 0           | -           | 0           | 0           | 0           |
| n3                                                                            | 0.5        | 0.5         | 0.5         | 0.5         | 0.6         | 0.8         | 1.1         | 1.5         | 2.3         | 2.8         |
| NOTE 1: The transmitter shall be set to $P_{UMAX}$ as defined in clause 6.2.4 |            |             |             |             |             |             |             |             |             |             |

**Table 7.3.2-1d Reference Sensitivity Degradation from PC3 to PC2 for FDD bands for UE supporting Tx Diversity**

| Operating Band                                                                | 5 MHz (dB) | 10 MHz (dB) | 15 MHz (dB) | 20 MHz (dB) | 25 MHz (dB) | 30 MHz (dB) | 35 MHz (dB) | 40 MHz (dB) | 45 MHz (dB) | 50 MHz (dB) |
|-------------------------------------------------------------------------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| n1                                                                            | 0          | 0           | 0           | 0           | 0           | 0           | -           | 0           | 0           | 0           |
| n3                                                                            | 1.4        | 1.5         | 1.5         | 1.5         | 1.6         | 1.7         | 2.8         | 5           | 5.5         | 6.0         |
| NOTE 1: The transmitter shall be set to $P_{UMAX}$ as defined in clause 6.2.4 |            |             |             |             |             |             |             |             |             |             |

For UE(s) equipped with 4 Rx antenna ports, reference sensitivity for 2Rx antenna ports in Table 7.3.2-1a and in Table 7.3.2-1b shall be modified by the amount given in  $\Delta R_{B,4R}$  in Table 7.3.2-2 for the applicable operating bands.

**Table 7.3.2-2: Four antenna port reference sensitivity allowance  $\Delta R_{IB,4R}$** 

| Operating band                                            | $\Delta R_{IB,4R}$ (dB) |
|-----------------------------------------------------------|-------------------------|
| n8, n28, n71                                              | -2.7 <sup>1</sup>       |
| n1, n2, n3, n30, n40, n7, n34,<br>n38, n39, n41, n66, n70 | -2.7                    |
| n48, n77, n78, n79, n104                                  | -2.2                    |
| NOTE 1: 4 Rx operation is targeted for FWA form factor    |                         |

The reference receive sensitivity (REFSENS) requirement specified in Table 7.3.2-1a, Table 7.3.2-1b, Table 7.3.2-1c, Table 7.3.2-1d and Table 7.3.2-2 shall be met with uplink transmission bandwidth less than or equal to that specified in Table 7.3.2-3.

Table 7.3.2-3: Uplink configuration for reference sensitivity

| Operating band / SCS (kHz) / Channel bandwidth (MHz) / Duplex mode |     |                 |                 |                 |                  |                  |                  |                 |                  |                  |                  |    |    |    |    |     | Duplex Mode |
|--------------------------------------------------------------------|-----|-----------------|-----------------|-----------------|------------------|------------------|------------------|-----------------|------------------|------------------|------------------|----|----|----|----|-----|-------------|
| Operating Band                                                     | SCS | 5               | 10              | 15              | 20               | 25               | 30               | 35              | 40               | 45               | 50               | 60 | 70 | 80 | 90 | 100 |             |
| n1                                                                 | 15  | 25              | 50 <sup>1</sup> | 75 <sup>1</sup> | 100 <sup>1</sup> | 128 <sup>1</sup> | 128 <sup>1</sup> |                 | 128 <sup>1</sup> | 128 <sup>1</sup> | 128 <sup>1</sup> |    |    |    |    |     | FDD         |
|                                                                    | 30  |                 | 24              | 36 <sup>1</sup> | 50 <sup>1</sup>  | 64 <sup>1</sup>  | 64 <sup>1</sup>  |                 | 64 <sup>1</sup>  | 64 <sup>1</sup>  | 64 <sup>1</sup>  |    |    |    |    |     |             |
|                                                                    | 60  |                 | 10 <sup>1</sup> | 18              | 24               | 30 <sup>1</sup>  | 30 <sup>1</sup>  |                 | 30 <sup>1</sup>  | 30 <sup>1</sup>  | 30 <sup>1</sup>  |    |    |    |    |     |             |
| n2                                                                 | 15  | 25              | 50 <sup>1</sup> | 50 <sup>1</sup> | 50 <sup>1</sup>  | 50 <sup>1</sup>  | 48 <sup>1</sup>  | 40 <sup>1</sup> | 40 <sup>1</sup>  |                  |                  |    |    |    |    |     | FDD         |
|                                                                    | 30  | 10 <sup>1</sup> | 24              | 24 <sup>1</sup> | 24 <sup>1</sup>  | 24 <sup>1</sup>  | 24 <sup>1</sup>  | 20 <sup>1</sup> | 20 <sup>1</sup>  |                  |                  |    |    |    |    |     |             |
|                                                                    | 60  |                 | 10 <sup>1</sup> | 10 <sup>1</sup> | 10 <sup>1</sup>  | 10 <sup>1</sup>  | 10 <sup>1</sup>  | 10 <sup>1</sup> | 10 <sup>1</sup>  |                  |                  |    |    |    |    |     |             |
| n3                                                                 | 15  | 25              | 50 <sup>1</sup> | 50 <sup>1</sup> | 50 <sup>1</sup>  | 50 <sup>1</sup>  | 50 <sup>1</sup>  | 50 <sup>1</sup> | 50 <sup>1</sup>  | 50 <sup>1</sup>  | 50 <sup>1</sup>  |    |    |    |    |     | FDD         |
|                                                                    | 30  |                 | 24              | 24 <sup>1</sup> | 24 <sup>1</sup>  | 24 <sup>1</sup>  | 24 <sup>1</sup>  | 24 <sup>1</sup> | 24 <sup>1</sup>  | 24 <sup>1</sup>  | 24 <sup>1</sup>  |    |    |    |    |     |             |
|                                                                    | 60  |                 | 10 <sup>1</sup> | 10 <sup>1</sup> | 10 <sup>1</sup>  | 10 <sup>1</sup>  | 10 <sup>1</sup>  | 10 <sup>1</sup> | 10 <sup>1</sup>  | 10 <sup>1</sup>  | 10 <sup>1</sup>  |    |    |    |    |     |             |
| n5                                                                 | 15  | 25              | 25 <sup>1</sup> | 20 <sup>1</sup> | 20 <sup>1</sup>  | Note 5           |                  |                 |                  |                  |                  |    |    |    |    |     | FDD         |
|                                                                    | 30  |                 | 12 <sup>1</sup> | 10 <sup>1</sup> | 10 <sup>1</sup>  | Note 5           |                  |                 |                  |                  |                  |    |    |    |    |     |             |
| n7                                                                 | 15  | 25              | 50 <sup>1</sup> | 75 <sup>1</sup> | 75 <sup>1</sup>  | 72 <sup>1</sup>  | 64 <sup>1</sup>  | 45 <sup>1</sup> | 45 <sup>1</sup>  |                  | 45 <sup>1</sup>  |    |    |    |    |     | FDD         |
|                                                                    | 30  |                 | 24              | 36 <sup>1</sup> | 36 <sup>1</sup>  | 36 <sup>1</sup>  | 32 <sup>1</sup>  | 20 <sup>1</sup> | 20 <sup>1</sup>  |                  | 20 <sup>1</sup>  |    |    |    |    |     |             |
|                                                                    | 60  |                 | 10 <sup>1</sup> | 18              | 18 <sup>1</sup>  | 18 <sup>1</sup>  | 16 <sup>1</sup>  | 10 <sup>1</sup> | 10 <sup>1</sup>  |                  | 10 <sup>1</sup>  |    |    |    |    |     |             |
| n8                                                                 | 15  | 25              | 25 <sup>1</sup> | 20 <sup>1</sup> | 20 <sup>1</sup>  |                  |                  | Note 5          |                  |                  |                  |    |    |    |    |     | FDD         |
|                                                                    | 30  |                 | 12 <sup>1</sup> | 10 <sup>1</sup> | 10 <sup>1</sup>  |                  |                  | Note 5          |                  |                  |                  |    |    |    |    |     |             |
| n12                                                                | 15  | 20 <sup>1</sup> | 20 <sup>1</sup> | 20 <sup>1</sup> |                  |                  |                  |                 |                  |                  |                  |    |    |    |    |     | FDD         |
|                                                                    | 30  |                 | 10 <sup>1</sup> | 10 <sup>1</sup> |                  |                  |                  |                 |                  |                  |                  |    |    |    |    |     |             |
| n13                                                                | 15  | 20 <sup>1</sup> | 20 <sup>1</sup> |                 |                  |                  |                  |                 |                  |                  |                  |    |    |    |    |     | FDD         |
|                                                                    | 30  |                 | 10 <sup>1</sup> |                 |                  |                  |                  |                 |                  |                  |                  |    |    |    |    |     |             |
| n14                                                                | 15  | 20 <sup>1</sup> | 20 <sup>1</sup> |                 |                  |                  |                  |                 |                  |                  |                  |    |    |    |    |     | FDD         |
|                                                                    | 30  |                 | 10 <sup>1</sup> |                 |                  |                  |                  |                 |                  |                  |                  |    |    |    |    |     |             |
| n18                                                                | 15  | 25              | 25 <sup>1</sup> | 25 <sup>1</sup> |                  |                  |                  |                 |                  |                  |                  |    |    |    |    |     | FDD         |
|                                                                    | 30  |                 | 10 <sup>1</sup> | 10 <sup>1</sup> |                  |                  |                  |                 |                  |                  |                  |    |    |    |    |     |             |
| n20                                                                | 15  | 25              | 20 <sup>1</sup> | 20 <sup>2</sup> | 20 <sup>2</sup>  |                  |                  |                 |                  |                  |                  |    |    |    |    |     | FDD         |
|                                                                    | 30  |                 | 10 <sup>1</sup> | 10 <sup>2</sup> | 10 <sup>2</sup>  |                  |                  |                 |                  |                  |                  |    |    |    |    |     |             |
| n24                                                                | 15  | 25              | 50              |                 |                  |                  |                  |                 |                  |                  |                  |    |    |    |    |     | FDD         |
|                                                                    | 30  |                 | 24              |                 |                  |                  |                  |                 |                  |                  |                  |    |    |    |    |     |             |
|                                                                    | 60  |                 | 10              |                 |                  |                  |                  |                 |                  |                  |                  |    |    |    |    |     |             |
| n25                                                                | 15  | 25              | 50 <sup>1</sup> | 50 <sup>1</sup> | 50 <sup>1</sup>  | 50 <sup>1</sup>  | 48 <sup>1</sup>  | 40 <sup>1</sup> | 40 <sup>1</sup>  | Note 5           |                  |    |    |    |    |     | FDD         |
|                                                                    | 30  |                 | 24              | 24 <sup>1</sup> | 24 <sup>1</sup>  | 24 <sup>1</sup>  | 24 <sup>1</sup>  | 20 <sup>1</sup> | 20 <sup>1</sup>  | Note 5           |                  |    |    |    |    |     |             |
|                                                                    | 60  |                 | 10 <sup>1</sup> | 10 <sup>1</sup> | 10 <sup>1</sup>  | 10 <sup>1</sup>  | 10 <sup>1</sup>  | 10 <sup>1</sup> | 10 <sup>1</sup>  | Note 5           |                  |    |    |    |    |     |             |
| n26                                                                | 15  | 25              | 25 <sup>1</sup> | 25 <sup>1</sup> | 25 <sup>1</sup>  | Note 5           | Note 5           |                 |                  |                  |                  |    |    |    |    |     | FDD         |
|                                                                    | 30  |                 | 12 <sup>1</sup> | 12 <sup>1</sup> | 12 <sup>1</sup>  | Note 5           | Note 5           |                 |                  |                  |                  |    |    |    |    |     |             |
| n28                                                                | 15  | 25              | 25 <sup>1</sup> | 25 <sup>1</sup> | 25 <sup>1</sup>  | 25 <sup>1</sup>  | 25 <sup>1</sup>  |                 |                  |                  |                  |    |    |    |    |     | FDD         |
|                                                                    | 30  |                 | 10 <sup>1</sup> | 10 <sup>1</sup> | 10 <sup>1</sup>  | 10 <sup>1</sup>  | 10 <sup>1</sup>  |                 |                  |                  |                  |    |    |    |    |     |             |
| n30                                                                | 15  | 20 <sup>1</sup> | 20 <sup>1</sup> |                 |                  |                  |                  |                 |                  |                  |                  |    |    |    |    |     | FDD         |

| Operating band / SCS (kHz) / Channel bandwidth (MHz) / Duplex mode |     |    |                 |                 |                  |                  |                 |                  |                  |                  |                  |     |     |        |     |     |             |
|--------------------------------------------------------------------|-----|----|-----------------|-----------------|------------------|------------------|-----------------|------------------|------------------|------------------|------------------|-----|-----|--------|-----|-----|-------------|
| Operating Band                                                     | SCS | 5  | 10              | 15              | 20               | 25               | 30              | 35               | 40               | 45               | 50               | 60  | 70  | 80     | 90  | 100 | Duplex Mode |
| n34                                                                | 30  |    | 10 <sup>1</sup> |                 |                  |                  |                 |                  |                  |                  |                  |     |     |        |     |     | TDD         |
|                                                                    | 15  | 25 | 50              | 75              |                  |                  |                 |                  |                  |                  |                  |     |     |        |     |     |             |
|                                                                    | 30  |    | 24              | 36              |                  |                  |                 |                  |                  |                  |                  |     |     |        |     |     |             |
| n38                                                                | 60  |    | 10              | 18              |                  |                  |                 |                  |                  |                  |                  |     |     |        |     |     | TDD         |
|                                                                    | 15  | 25 | 50              | 75              | 100              | 128              | 160             |                  | 216              |                  |                  |     |     |        |     |     |             |
|                                                                    | 30  |    | 24              | 36              | 50               | 64               | 75              |                  | 100              |                  |                  |     |     |        |     |     |             |
| n39                                                                | 60  |    | 10              | 18              | 24               | 30               | 36              |                  | 50               |                  |                  |     |     |        |     |     | TDD         |
|                                                                    | 15  | 25 | 50              | 75              | 100              | 128              | 160             |                  | 216              |                  |                  |     |     |        |     |     |             |
|                                                                    | 30  |    | 24              | 36              | 50               | 64               | 75              |                  | 100              |                  |                  |     |     |        |     |     |             |
| n40                                                                | 60  |    | 10              | 18              | 24               | 30               | 36              |                  | 50               |                  |                  |     |     |        |     |     | TDD         |
|                                                                    | 15  | 25 | 50              | 75              | 100              | 128              | 160             |                  | 216              |                  | 270              |     |     |        |     |     |             |
|                                                                    | 30  |    | 24              | 36              | 50               | 64               | 75              |                  | 100              |                  | 128              | 162 | 180 | 216    | 243 | 270 |             |
| n41, n90                                                           | 60  |    | 10              | 18              | 24               | 30               | 36              |                  | 50               |                  | 64               | 75  | 90  | 100    | 120 | 135 | TDD         |
|                                                                    | 15  | 25 | 50              | 75              | 100              | 128              | 160             | 180              | 216              | 240              | 270              |     |     |        |     |     |             |
|                                                                    | 30  |    | 24              | 36              | 50               | 64               | 75              | 90               | 100              | 108              | 128              | 162 | 180 | 216    | 243 | 270 |             |
| n48                                                                | 60  |    | 10              | 18              | 24               | 30               | 36              | 40               | 50               | 54               | 64               | 75  | 90  | 100    | 120 | 135 | TDD         |
|                                                                    | 15  | 25 | 50              | 75              | 100              |                  | 160             |                  | 216              |                  |                  |     |     |        |     |     |             |
|                                                                    | 30  |    | 24              | 36              | 50               |                  | 75              |                  | 100              |                  |                  |     |     |        |     |     |             |
| n50                                                                | 60  |    | 10              | 18              | 24               |                  | 36              |                  | 50               |                  |                  |     |     |        |     |     | TDD         |
|                                                                    | 15  | 25 | 50              | 75              | 100              |                  | 160             |                  | 216              |                  | 270              |     |     |        |     |     |             |
|                                                                    | 30  |    | 24              | 36              | 50               |                  | 75              |                  | 100              |                  | 128              | 162 |     | Note 3 |     |     |             |
| n51                                                                | 60  |    | 10              | 18              | 24               |                  | 36              |                  | 50               |                  | 64               | 75  |     | Note 3 |     |     | TDD         |
| n53                                                                | 15  | 25 |                 |                 |                  |                  |                 |                  |                  |                  |                  |     |     |        |     |     |             |
|                                                                    | 15  | 25 | 50              |                 |                  |                  |                 |                  |                  |                  |                  |     |     |        |     |     |             |
|                                                                    | 30  |    | 24              |                 |                  |                  |                 |                  |                  |                  |                  |     |     |        |     |     |             |
| n65                                                                | 60  |    | 10              |                 |                  |                  |                 |                  |                  |                  |                  |     |     |        |     |     | FDD         |
|                                                                    | 15  | 25 | 50 <sup>1</sup> | 75 <sup>1</sup> | 100 <sup>1</sup> |                  |                 |                  |                  |                  | 128 <sup>1</sup> |     |     |        |     |     |             |
|                                                                    | 30  |    | 24              | 36 <sup>1</sup> | 50 <sup>1</sup>  |                  |                 |                  |                  |                  | 64 <sup>1</sup>  |     |     |        |     |     |             |
| n66                                                                | 60  |    | 10 <sup>1</sup> | 18              | 24               |                  |                 |                  |                  |                  | 30 <sup>1</sup>  |     |     |        |     |     | FDD         |
|                                                                    | 15  | 25 | 50 <sup>1</sup> | 75 <sup>1</sup> | 100 <sup>1</sup> | 128 <sup>1</sup> | 160             | 180 <sup>1</sup> | 216              | 240 <sup>1</sup> |                  |     |     |        |     |     |             |
|                                                                    | 30  |    | 24              | 36 <sup>1</sup> | 50 <sup>1</sup>  | 64 <sup>1</sup>  | 75 <sup>1</sup> | 90 <sup>1</sup>  | 100 <sup>1</sup> | 108 <sup>1</sup> |                  |     |     |        |     |     |             |
| n70                                                                | 60  |    | 10 <sup>1</sup> | 18              | 24               | 30 <sup>1</sup>  | 36 <sup>1</sup> | 40 <sup>1</sup>  | 50 <sup>1</sup>  | 54 <sup>1</sup>  |                  |     |     |        |     |     | FDD         |
|                                                                    | 15  | 25 | 50 <sup>1</sup> | 75 <sup>1</sup> | Note 3           | Note 3           |                 |                  |                  |                  |                  |     |     |        |     |     |             |
|                                                                    | 30  |    | 24              | 36 <sup>1</sup> | Note 3           | Note 3           |                 |                  |                  |                  |                  |     |     |        |     |     |             |
| n71                                                                | 60  |    | 10 <sup>1</sup> | 18              | Note 3           | Note 3           |                 |                  |                  |                  |                  |     |     |        |     |     | FDD         |
|                                                                    | 15  | 25 | 25 <sup>1</sup> | 20 <sup>1</sup> | 20 <sup>1</sup>  | Note 5           | Note 5          | Note 5           |                  |                  |                  |     |     |        |     |     |             |
|                                                                    | 30  |    | 12 <sup>1</sup> | 10 <sup>1</sup> | 10 <sup>1</sup>  | Note 5           | Note 5          | Note 5           |                  |                  |                  |     |     |        |     |     |             |



| Operating band / SCS (kHz) / Channel bandwidth (MHz) / Duplex mode |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                 |                   |                 |                 |     |     |    |     |    |     |     |     |     |     |     |             |
|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------------|-----------------|-----------------|-----|-----|----|-----|----|-----|-----|-----|-----|-----|-----|-------------|
| Operating Band                                                     | SCS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 5               | 10                | 15              | 20              | 25  | 30  | 35 | 40  | 45 | 50  | 60  | 70  | 80  | 90  | 100 | Duplex Mode |
| n74                                                                | 15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 25              | 25 <sup>1</sup>   | 25 <sup>1</sup> | 25 <sup>1</sup> |     |     |    |     |    |     |     |     |     |     |     | FDD         |
|                                                                    | 30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                 | 10 <sup>1</sup>   | 10 <sup>1</sup> | 10 <sup>1</sup> |     |     |    |     |    |     |     |     |     |     |     |             |
|                                                                    | 60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                 | 5 <sup>1</sup>    | 5 <sup>1</sup>  | 5 <sup>1</sup>  |     |     |    |     |    |     |     |     |     |     |     |             |
| n77                                                                | 15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                 | 50                | 75              | 100             | 128 | 160 |    | 216 |    | 270 |     |     |     |     |     | TDD         |
|                                                                    | 30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                 | 24                | 36              | 50              | 64  | 75  |    | 100 |    | 128 | 162 | 180 | 216 | 243 | 270 |             |
|                                                                    | 60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                 | 10                | 18              | 24              | 30  | 36  |    | 50  |    | 64  | 75  | 90  | 100 | 120 | 135 |             |
| n78                                                                | 15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                 | 50                | 75              | 100             | 128 | 160 |    | 216 |    | 270 |     |     |     |     |     | TDD         |
|                                                                    | 30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                 | 24                | 36              | 50              | 64  | 75  |    | 100 |    | 128 | 162 | 180 | 216 | 243 | 270 |             |
|                                                                    | 60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                 | 10                | 18              | 24              | 30  | 36  |    | 50  |    | 64  | 75  | 90  | 100 | 120 | 135 |             |
| n79                                                                | 15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                 | 50                |                 | 100             |     | 160 |    | 216 |    | 270 |     |     |     |     |     | TDD         |
|                                                                    | 30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                 | 24                |                 | 50              |     | 75  |    | 100 |    | 128 | 162 | 180 | 216 | 243 | 270 |             |
|                                                                    | 60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                 | 10                |                 | 24              |     | 36  |    | 50  |    | 64  | 75  | 90  | 100 | 120 | 135 |             |
| n85                                                                | 15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 20 <sup>1</sup> | 20 <sup>1</sup>   | 20 <sup>1</sup> |                 |     |     |    |     |    |     |     |     |     |     |     | FDD         |
|                                                                    | 30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                 | 10 <sup>1</sup>   | 10 <sup>1</sup> |                 |     |     |    |     |    |     |     |     |     |     |     |             |
| n91                                                                | 15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 25 <sup>4</sup> | 20 <sup>1.4</sup> |                 |                 |     |     |    |     |    |     |     |     |     |     |     | FDD         |
| n92                                                                | 15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 25              | 20 <sup>1</sup>   | 20 <sup>1</sup> | 20 <sup>1</sup> |     |     |    |     |    |     |     |     |     |     |     | FDD         |
|                                                                    | 30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                 | 10 <sup>1</sup>   | 10 <sup>1</sup> | 10 <sup>1</sup> |     |     |    |     |    |     |     |     |     |     |     |             |
| n93                                                                | 15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 25 <sup>4</sup> | 25 <sup>1.4</sup> |                 |                 |     |     |    |     |    |     |     |     |     |     |     | FDD         |
| n94                                                                | 15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 25              | 25 <sup>1</sup>   | 20 <sup>1</sup> | 20 <sup>1</sup> |     |     |    |     |    |     |     |     |     |     |     | FDD         |
|                                                                    | 30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                 | 12 <sup>1</sup>   | 10 <sup>1</sup> | 10 <sup>1</sup> |     |     |    |     |    |     |     |     |     |     |     |             |
| n100                                                               | 15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 25              |                   |                 |                 |     |     |    |     |    |     |     |     |     |     |     | FDD         |
| n101                                                               | 15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 25              | 50                |                 |                 |     |     |    |     |    |     |     |     |     |     |     | TDD         |
|                                                                    | 30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                 | 24                |                 |                 |     |     |    |     |    |     |     |     |     |     |     |             |
| n104                                                               | 15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                 |                   |                 | 100             |     |     |    | 216 |    | 270 |     |     |     |     |     | TDD         |
|                                                                    | 30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                 |                   |                 | 50              |     |     |    | 100 |    | 128 | 162 | 180 | 216 | 243 | 270 |             |
|                                                                    | 60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                 |                   |                 | 24              |     |     |    | 50  |    | 64  | 75  | 90  | 100 | 120 | 135 |             |
| Note 1:                                                            | UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.3.2-1).                                                                                                                                                                                                                                                                                                   |                 |                   |                 |                 |     |     |    |     |    |     |     |     |     |     |     |             |
| Note 2:                                                            | For band n20; for 15 kHz SCS, in the case of 15 MHz channel bandwidth, the UL resource blocks shall be located at RB <sub>start</sub> 11 and in the case of 20 MHz channel bandwidth, the UL resource blocks shall be located at RB <sub>start</sub> 16; for 30 kHz SCS, in the case of 15 MHz channel bandwidth, the UL resource blocks shall be located at RB <sub>start</sub> 6 and in the case of 20 MHz channel bandwidth, the UL resource blocks shall be located at RB <sub>start</sub> 8; |                 |                   |                 |                 |     |     |    |     |    |     |     |     |     |     |     |             |
| Note 3:                                                            | For DL channel bandwidths that do not have symmetric UL channel bandwidth, highest valid UL configuration with lowest TX-RX separation (Table 5.4.4-1) shall be used unless otherwise specified.                                                                                                                                                                                                                                                                                                  |                 |                   |                 |                 |     |     |    |     |    |     |     |     |     |     |     |             |
| Note 4:                                                            | For band n91 and n93, largest supported UL bandwidth configuration shall be used.                                                                                                                                                                                                                                                                                                                                                                                                                 |                 |                   |                 |                 |     |     |    |     |    |     |     |     |     |     |     |             |
| Note 5:                                                            | For this DL channel bandwidth, the UL configuration of the highest UL channel bandwidth specified in Table 5.3.6-1 and the nominal Tx-Rx frequency separation specified in Table 5.4.4-1 shall be used, i.e. ΔF <sub>TX-RX</sub> as defined in clause 5.3.6 does not apply.                                                                                                                                                                                                                       |                 |                   |                 |                 |     |     |    |     |    |     |     |     |     |     |     |             |

Unless given by Table 7.3.2-4, the minimum requirements specified in Tables 7.3.2-1a, Tables 7.3.2-1b, Tables 7.3.2-1c, Tables 7.3.2-1d and 7.3.2-2 shall be verified with the network signalling value NS\_01 (Table 6.2.3-1) configured.

**Table 7.3.2-4: Network signaling value for reference sensitivity**

| Operating band | Network Signalling value |
|----------------|--------------------------|
| n2             | NS_03                    |
| n12            | NS_06                    |
| n13            | NS_06                    |
| n14            | NS_06                    |
| n24            | NS_56                    |
| n25            | NS_03                    |
| n30            | NS_21                    |
| n48            | NS_27                    |
| n53            | NS_45                    |
| n66            | NS_03                    |
| n70            | NS_03                    |
| n71            | NS_35                    |
| n85            | NS_06                    |

### 7.3.3 $\Delta R_{IB,c}$

For a UE supporting CA, SUL or DC band combination, the minimum requirement for reference sensitivity in Table 7.3.2-1a and Table 7.3.2-1b shall be increased by the amount given by  $\Delta R_{IB,c}$  defined in clause 7.3A, 7.3B, 7.3C in this specification and 7.3A, 7.3B in TS 38.101-3 [3] for the applicable operating bands.

In case the UE supports more than one of band combinations for CA, SUL or DC, and an operating band belongs to more than one band combinations then

- When the operating band frequency range is  $\leq 1$  GHz, the applicable additional  $\Delta R_{IB,c}$  shall be the average value for all band combinations defined in clause 7.3A, 7.3B, 7.3C in this specification and 7.3A, 7.3B in TS 38.101-3 [3], truncated to one decimal place that apply for that operating band among the supported band combinations. In case there is a harmonic relation between low band UL and high band DL, then the maximum  $\Delta R_{IB,c}$  among the different supported band combinations involving such band shall be applied
- When the operating band frequency range is  $> 1$  GHz, the applicable additional  $\Delta R_{IB,c}$  shall be the maximum value for all band combinations defined in clause 7.3A, 7.3B, 7.3C in this specification and 7.3A, 7.3B in TS 38.101-3 [3] for the applicable operating bands.

## 7.3A Reference sensitivity for CA

### 7.3A.1 General

The reference sensitivity power level REFSENS is the minimum mean power applied to each one of the UE antenna ports for all UE categories, at which the throughput shall meet or exceed the requirements for the specified reference measurement channel. For operations with 4 Rx antenna ports, the MSD in the applicable bands shall be increased by the absolute value of  $\Delta R_{IB,4R}$  in Table 7.3.2-2 when MSD  $> 0$ .

For reference sensitivity exception test points where the specified carrier frequency does not correspond to a valid NR-ARFCN, the closest NR-ARFCN as specified in clause 5.4.2 applies.

For reference sensitivity level tests or reference sensitivity exception tests specified in clause 7.3A, SCS=15kHz based UL test configuration can be replaced by SCS=30kHz based UL test configuration. The equivalent substitution relationship between different SCS UL test configuration is shown in table 7.3A.1-1 for the operating bands above 2.2GHz.

**Table 7.3A.1-1: Equivalent substitution relationship between different SCS UL test configuration**

| SCS (kHz) | (BW[MHz], $L_{crb}$ ) |          |          |           |           |           |           |           |           |           |
|-----------|-----------------------|----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 15        | (5, 25)               | (10, 50) | (15, 75) | (20, 100) | (25, 128) | (30, 160) | (35, 180) | (40, 216) | (45, 240) | (50, 270) |

|    |        |          |          |          |          |          |          |           |           |           |
|----|--------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|
| 30 | (5,12) | (10, 24) | (15, 36) | (20, 50) | (25, 64) | (30, 75) | (35, 90) | (40, 100) | (45, 108) | (50, 128) |
|----|--------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|

When UE supports higher power class than default power class for a CA configuration with a single UL CC with DL CA and applicability note for the supported power class is not present for this configuration in clause 5.5A.

- if the corresponding higher power class MSD is not specified, reference sensitivity and exceptions for reference sensitivity of default power class shall be verified with output power limited to default power class
- otherwise, the higher power class reference sensitivity and exceptions for reference sensitivity shall be verified with the power class of CA configuration supported by the UE.

## 7.3A.2 Reference sensitivity power level for CA

### 7.3A.2.1 Reference sensitivity power level for Intra-band contiguous CA

For intra-band contiguous carrier aggregation, the throughput of each component carrier shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3.2-1a, Table 7.3.2-1b, Table 7.3.2-2, and Table 7.3.2-3.

For UE(s) supporting one uplink carrier, the uplink configuration of the PCC shall be in accordance with Table 7.3.2-3 and the downlink PCC carrier center frequency shall be configured closer to uplink operating band than any of the downlink SCC center frequency.

For aggregation of two or more downlink FDD carriers with two uplink carriers, the reference sensitivity is defined only for the specific uplink and downlink test points which are specified in Table 7.3A.2.1-1 and the reference sensitivity power level increased by  $\Delta R_{IBC}$ . The requirements apply with all downlink carriers active. Unless given by Table 7.3.2-4, the reference sensitivity requirements shall be verified with the network signaling value NS\_01 (Table 6.2.3.1-1) configured.

**Table 7.3A.2.1-1: Intra-band contiguous CA uplink configuration for reference sensitivity**

| CA configuration | SCS (PCC/SCC) (kHz) | Aggregated channel bandwidth (PCC+SCC) | UL PCC allocation (L <sub>CRB</sub> ) | UL SCC allocation (L <sub>CRB</sub> ) | PCC $\Delta R_{IBC}$ (dB) | SCC $\Delta R_{IBC}$ (dB) | Duplex mode |
|------------------|---------------------|----------------------------------------|---------------------------------------|---------------------------------------|---------------------------|---------------------------|-------------|
| CA_n5B           | 15/15               | 10MHz + 10MHz                          | 10 (RB <sub>start</sub> = 0)          | 10 (RB <sub>start</sub> = 42)         | 30.8                      | 26.1                      | FDD         |
| CA_n7B           | 15/15               | 10MHz + 40MHz                          | 9 (RB <sub>start</sub> = 26)          | 36 (RB <sub>start</sub> = 180)        | 34                        | 25                        | FDD         |

NOTE 1: All combinations of channel bandwidths defined in Table 5.5A.1-1.  
NOTE 2: The carrier centre frequency of SCC in the UL operating band is configured closer to the DL operating band.  
NOTE 3: The transmitted power over both PCC and SCC shall be set to P<sub>UMAX</sub> as defined in subclause 6.2A.4.  
NOTE 4: The PCC allocation is same as Transmission bandwidth configuration N<sub>RB</sub> as defined in Table 5.3.2-1.

### 7.3A.2.2 Reference sensitivity power level for Intra-band non-contiguous CA

For intra-band non-contiguous carrier aggregation with one uplink carrier and two or more downlink sub-blocks, throughput of each downlink component carrier shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) and parameters specified in Table 7.3.2-1a, Table 7.3.2-1b, Table 7.3.2-2, and Table 7.3A.2.2-1 with the reference sensitivity power level increased by  $\Delta R_{IBNC}$  given in Table 7.3A.2.2-1 for the SCC(s).

For aggregation of two or more downlink FDD carriers with one uplink carrier the reference sensitivity is defined only for the specific uplink and downlink test points which are specified in Table 7.3A.2.2-1. The requirements apply with all downlink carriers active. Unless given by Table 7.3.2-4, the reference sensitivity requirements shall be verified with the network signaling value NS\_01 (Table 6.2.3.1-1) configured.

**Table 7.3A.2.2-1: Intra-band non-contiguous CA with one uplink configuration for reference sensitivity in FDD bands.**

| CA configuration                                                                                                                                    | SCS (PCC/SCC) (kHz) | Aggregated channel bandwidth (PCC+SCC) | $W_{\text{gap}}$ / [MHz]         | UL PCC allocation ( $L_{\text{CRB}}$ ) | $\Delta R_{\text{IBNC}}$ (dB) | Duplex mode |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|----------------------------------------|----------------------------------|----------------------------------------|-------------------------------|-------------|
| CA_n1(2A)                                                                                                                                           | 15/15               | 5MHz + 5MHz                            | $0.0 < W_{\text{gap}} \leq 50.0$ | 25                                     | 0.5                           | FDD         |
| CA_n2(2A)                                                                                                                                           | 15/15               | 5MHz + 5MHz                            | $W_{\text{gap}} = 50.0$          | $10^5$                                 | 5.0                           | FDD         |
|                                                                                                                                                     |                     |                                        | $W_{\text{gap}} = 30.0$          | 25                                     | 0.0                           |             |
| CA_n3(2A)                                                                                                                                           | 15/15               | 5MHz + 5MHz                            | $W_{\text{gap}} = 65.0$          | $12^5$                                 | 4.7                           | FDD         |
|                                                                                                                                                     |                     |                                        | $W_{\text{gap}} = 45.0$          | $25^5$                                 | 0.0                           |             |
| CA_n5(2A)                                                                                                                                           | 15/15               | 15MHz + 5MHz                           | $W_{\text{gap}} = 5.0$           | $5^5$                                  | 6.3                           | FDD         |
| CA_n7(2A)                                                                                                                                           | 15/15               | 10MHz + 5MHz                           | $W_{\text{gap}} = 55$            | $32^5$                                 | 0.0                           | FDD         |
|                                                                                                                                                     |                     |                                        | $W_{\text{gap}} = 30$            | $50^5$                                 | 0.0                           |             |
| CA_n12(2A)                                                                                                                                          | 15/15               | 5MHz + 5MHz                            | $0.0 < W_{\text{gap}} \leq 7.0$  | 5<br>( $R_{\text{Bstart}}=12$ )        | 3                             | FDD         |
| CA_n25(2A) <sup>9</sup>                                                                                                                             | 15/15               | 5MHz + 5MHz                            | $W_{\text{gap}} = 55.0$          | $10^5$                                 | 5.0                           | FDD         |
|                                                                                                                                                     |                     |                                        | $W_{\text{gap}} = 30.0$          | 25                                     | 0.0                           |             |
| CA_n25(2A) <sub>10</sub>                                                                                                                            | 15/15               | 40MHz + 5MHz                           | $W_{\text{gap}} = 20.0$          | 40 ( $R_{\text{Bstart}} = 176$ )       | $[24.6]^8$                    | FDD         |
| CA_n25(3A)                                                                                                                                          |                     |                                        |                                  |                                        |                               |             |
| CA_n66(2A)<br>CA_n66(3A)                                                                                                                            | N/A                 | NOTE 1                                 | NOTE 2                           | NOTE 3,<br>NOTE 4                      | 0.0                           | FDD         |
| CA_n71(2A)                                                                                                                                          | 15/15               | 5MHz + 5MHz                            | $W_{\text{gap}} = 25.0$          | 5                                      | 4.0                           | FDD         |
|                                                                                                                                                     |                     |                                        | $W_{\text{gap}} = 5.0$           | 20                                     | 0.0                           |             |
|                                                                                                                                                     |                     | 10MHz + 5MHz                           | $W_{\text{gap}} = 20.0$          | 5 ( $R_{\text{Bstart}} = 9$ )          | 4.6                           |             |
|                                                                                                                                                     |                     |                                        | $W_{\text{gap}} = 5.0$           | 20 ( $R_{\text{Bstart}} = 9$ )         | 2.3                           |             |
|                                                                                                                                                     |                     | 15MHz + 10MHz                          | $W_{\text{gap}} = 10.0$          | 5 ( $R_{\text{Bstart}} = 2$ )          | 22.2                          |             |
|                                                                                                                                                     |                     |                                        | $W_{\text{gap}} = 5.0$           | 20 ( $R_{\text{Bstart}} = 19$ )        | 5.2                           |             |
| NOTE 1: All combinations of channel bandwidths defined in Table 5.5A.2-1.                                                                           |                     |                                        |                                  |                                        |                               |             |
| NOTE 2: All applicable sub-block gap sizes.                                                                                                         |                     |                                        |                                  |                                        |                               |             |
| NOTE 3: The PCC allocation is same as Transmission bandwidth configuration $N_{\text{RB}}$ as defined in Table 5.3.2-1.                             |                     |                                        |                                  |                                        |                               |             |
| NOTE 4: The carrier center frequency of PCC in the DL operating band is configured closer to the UL operating band.                                 |                     |                                        |                                  |                                        |                               |             |
| NOTE 5: Refers to the UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission. |                     |                                        |                                  |                                        |                               |             |
| NOTE 6: $W_{\text{gap}}$ is the sub-block gap between the two sub-blocks.                                                                           |                     |                                        |                                  |                                        |                               |             |
| NOTE 7: The carrier centre frequency of SCC in the DL operating band is configured closer to the UL operating band.                                 |                     |                                        |                                  |                                        |                               |             |
| NOTE 8: For operation with three or more non-contiguous component carriers, $\Delta R_{\text{IBNC}}$ applies to all secondary component carriers.   |                     |                                        |                                  |                                        |                               |             |
| NOTE 9: Bandwidth Combination Set 0.                                                                                                                |                     |                                        |                                  |                                        |                               |             |
| NOTE 10: Bandwidth Combination Set 1                                                                                                                |                     |                                        |                                  |                                        |                               |             |

### 7.3A.2.3 Reference sensitivity power level for Inter-band CA

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one NR band the throughput shall be  $\geq 95$  % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1 with parameters specified in Table 7.3.2-1a, Table 7.3.2-1b, Table 7.3.2-2, Table 7.3.2-3, and in Table 7.3F.2-1, Table 7.3F.2-2, Table 7.3F.2-3 for inter-band CA with one shared spectrum channel access band, modified in accordance with clause 7.3A.3.2. The reference sensitivity is defined to be met with all downlink component carriers active and one of the uplink carriers active. Exceptions to reference sensitivity are allowed in accordance with clause 7.3A.4, 7.3A.5 and 7.3A.6.

For the combination of intra-band and inter-band carrier aggregation, the intra-band CA relaxation,  $\Delta R_{\text{IBC}}$  and  $\Delta R_{\text{IBNC}}$ , are also applied according to the clause 7.3A.2.1 and 7.3A.2.2.

### 7.3A.2.4 Void

### 7.3A.3 $\Delta R_{IB,c}$ for CA

#### 7.3A.3.1 General

For a UE supporting a CA configuration, the  $\Delta R_{IB,c}$  applies for both SC and CA operation.

#### 7.3A.3.2 $\Delta R_{IB,c}$ for Inter-band CA

For the UE which supports inter-band carrier aggregation, the minimum requirement for reference sensitivity in clause 7.3A.2 shall be increased by the amount given by  $\Delta R_{IB,c}$  defined in clause 7.3A.3.2 for the applicable operating bands. Unless otherwise stated,  $\Delta R_{IB,c}$  is set to zero.

In case the UE supports more than one of band combinations for CA, SUL or DC, and an operating band belongs to more than one band combinations then

- When the operating band frequency range is  $\leq 1$  GHz, the applicable additional  $\Delta R_{IB,c}$  shall be the average value for all band combinations defined in clause 7.3A, 7.3B, 7.3C in this specification and 7.3A, 7.3B in TS 38.101-3 [3], truncated to one decimal place that apply for that operating band among the supported band combinations. In case there is a harmonic relation between low band UL and high band DL, then the maximum  $\Delta R_{IB,c}$  among the different supported band combinations involving such band shall be applied
- When the operating band frequency range is  $> 1$  GHz, the applicable additional  $\Delta R_{IB,c}$  shall be the maximum value for all band combinations defined in clause 7.3A, 7.3B, 7.3C in this specification and 7.3A, 7.3B in TS 38.101-3 [3] for the applicable operating bands.

##### 7.3A.3.2.1 $\Delta R_{IB,c}$ for two bands

**Table 7.3A.3.2.1-1:  $\Delta R_{IB,c}$  due to CA (two bands)**

| Inter-band CA combination | NR Band | $\Delta R_{IB,c}$ (dB) |
|---------------------------|---------|------------------------|
| CA_n1-n28                 | n28     | 0.2                    |
| CA_n1-n67                 | n67     | 0.2                    |
| CA_n1-n77                 | n1      | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n1-n78                 | n78     | 0.5                    |
| CA_n2-n48                 | n2      | 0.2                    |
|                           | n48     | 0.5                    |
| CA_n2-n66                 | n2      | 0.3                    |
|                           | n66     | 0.3                    |
| CA_n2-n77                 | n2      | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n2-n78                 | n2      | 0.2                    |
|                           | n78     | 0.5                    |
| CA_n3-n41                 | n41     | 0 <sup>4</sup>         |
|                           |         | 0.5 <sup>5</sup>       |
| CA_n3-n67                 | n3      | 0.3                    |
| CA_n3-n74                 | n3      | 0.3                    |
|                           | n74     | 0.5                    |
| CA_n3-n77                 | n3      | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n3-n78                 | n3      | 0.2                    |
|                           | n78     | 0.5                    |
| CA_n3-n79                 | n79     | 0.5                    |
| CA_n5-n12                 | n5      | 0.5                    |
|                           | n12     | 0.3                    |
| CA_n5-n28                 | n5      | 0.2                    |
|                           | n28     | 0.2                    |
| CA_n5-n77                 | n5      | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n5-n78                 | n5      | 0.2                    |

| Inter-band CA combination | NR Band | $\Delta R_{IB,c}$ (dB) |
|---------------------------|---------|------------------------|
|                           | n78     | 0.5                    |
| CA_n7-n8                  | n8      | 0.2                    |
| CA_n7-n40                 | n40     | 0.5                    |
| CA_n7-n46                 | n7      | 0.3                    |
| CA_n7-n66                 | n7      | 0.5                    |
|                           | n66     | 0.5                    |
| CA_n7-n77                 | n77     | 0.5                    |
| CA_n7-n78                 | n7      | 0.5                    |
|                           | n78     | 0.5                    |
| CA_n7-n79                 | n79     | 0.5                    |
| CA_n8-n28                 | n8      | 0.2                    |
|                           | n28     | 0.2                    |
| CA_n8-n77                 | n8      | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n8-n78                 | n8      | 0.2                    |
|                           | n78     | 0.5                    |
| CA_n8-n79                 | n79     | 0.5                    |
| CA_n12-n66                | n12     | 0.5                    |
| CA_n12-n71                | n12     | 0.8                    |
|                           | n71     | 0.8                    |
| CA_n12-n77                | n12     | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n13-n77                | n13     | 0.2                    |
|                           | n78     | 0.5                    |
| CA_n14-n77                | n14     | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n18-n77                | n77     | 0.5                    |
| CA_n18-n78                | n78     | 0.5                    |
| CA_n20-n78                | n78     | 0.5                    |
| CA_n20-n40                | n40     | 0.5                    |
| CA_n24-n48                | n24     | 0.2                    |
|                           | n48     | 0.5                    |
| CA_n24-n77                | n24     | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n25-n48                | n25     | 0.2                    |
|                           | n48     | 0.5                    |
| CA_n25-n66                | n25     | 0.3                    |
|                           | n66     | 0.3                    |
| CA_n25-n71                | n71     | 0.3                    |
| CA_n25-n77                | n25     | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n25-n78                | n25     | 0.2                    |
|                           | n78     | 0.5                    |
| CA_n28-n71                | n28     | 0.7                    |
|                           | n71     | 0.7                    |
| CA_n28-n74                | n28     | 0.2                    |
| CA_n28-n75                | n28     | 0.2                    |
| CA_n28-n77                | n28     | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n28-n78                | n28     | 0.2                    |
|                           | n78     | 0.5                    |
| CA_n28-n79                | n28     | 0.2                    |
|                           | n79     | 0.5                    |
| CA_n29-n77                | n29     | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n30-n66                | n30     | 0.5                    |
|                           | n66     | 0.4                    |
| CA_n30-n77                | n77     | 0.5                    |
| CA_n34-n40                | n34     | 0.3                    |
|                           | n40     | 0.3                    |
| CA_n34-n79                | n79     | 0.5                    |
| CA_n38-n66                | n38     | 0.5                    |
|                           | n66     | 0.5                    |

| Inter-band CA combination | NR Band | $\Delta R_{IB,c}$ (dB) |
|---------------------------|---------|------------------------|
| CA_n38-n78                | n38     | 0.4                    |
|                           | n78     | 0.5                    |
| CA_n38-n79                | n38     | 0.5                    |
|                           | n79     | 0.5                    |
| CA_n39-n40                | n39     | 0.3                    |
|                           | n40     | 0.3                    |
| CA_n39-n41                | n39     | 0.2 <sup>2</sup>       |
|                           | n41     | 0.2 <sup>2</sup>       |
|                           | n39     | 0.2 <sup>3</sup>       |
|                           | n41     | 0.2 <sup>3</sup>       |
| CA_n39-n79                | n79     | 0.5                    |
| CA_n40-n77                | n40     | 0.4                    |
|                           | n77     | 0.5                    |
| CA_n40-n78                | n40     | 0.4                    |
|                           | n78     | 0.5                    |
| CA_n40-n79                | n79     | 0.5                    |
| CA_n41-n48                | n41     | 0.5                    |
|                           | n48     | 0.5                    |
| CA_n41-n66                | n41     | 0.5 <sup>6</sup>       |
|                           |         | 1 <sup>7</sup>         |
|                           | n66     | 0.5                    |
| CA_n41-n71                | n71     | 0.2                    |
| CA_n41-n77 <sup>1</sup>   | n77     | 0.5                    |
| CA_n41-n78 <sup>1</sup>   | n78     | 0.5                    |
| CA_n41-n79                | n41     | 0.5                    |
|                           | n79     | 0.5                    |
| CA_n46-n48                | n48     | 0.5                    |
| CA_n46-n78                | n78     | 0.5                    |
| CA_n48-n53                | n48     | 0.5 <sup>3</sup>       |
| CA_n48-n66                | n48     | 0.5                    |
|                           | n66     | 0.2                    |
| CA_n48-n70                | n48     | 0.5                    |
|                           | n70     | 0.2                    |
| CA_n48-n96                | n48     | 0.5                    |
| CA_n50-n78                | n50     | 0.2 <sup>2</sup>       |
|                           | n78     | 0.2 <sup>2</sup>       |
|                           | n50     | 0.2 <sup>3</sup>       |
|                           | n78     | 0.2 <sup>3</sup>       |
| CA_n66-n77                | n66     | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n66-n78                | n66     | 0.2                    |
|                           | n78     | 0.5                    |
| CA_n70-n78                | n70     | 0.2                    |
|                           | n78     | 0.5                    |
| CA_n71-n77                | n71     | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n71-n78                | n71     | 0.2                    |
|                           | n78     | 0.5                    |
| CA_n74-n77                | n77     | 0.5                    |
| CA_n74-n78                | n78     | 0.5                    |
| CA_n75-n78                | n78     | 0.5                    |
| CA_n76-n78                | n78     | 0.5                    |
| CA_n78-n92                | n78     | 0.5                    |

NOTE 1: The requirements only apply when the sub-frame and Tx-Rx timings are synchronized between the component carriers. In the absence of synchronization, the requirements are not within scope of these specifications.

NOTE 2: Only applicable for UE supporting inter-band carrier aggregation with uplink in one NR band and without simultaneous Rx/Tx.

NOTE 3: Applicable for UE supporting inter-band carrier aggregation without simultaneous Rx/Tx.

NOTE 4: The requirement is applied for UE transmitting on the frequency range of 2515 – 2690 MHz.

NOTE 5: The requirement is applied for UE transmitting on the frequency range of 2496 – 2515 MHz.

| Inter-band CA combination                                                                       | NR Band | $\Delta R_{IB,c}$ (dB) |
|-------------------------------------------------------------------------------------------------|---------|------------------------|
| NOTE 6: The requirement is applied for UE transmitting on the frequency range of 2545-2690 MHz. |         |                        |
| NOTE 7: The requirement is applied for UE transmitting on the frequency range of 2496-2545 MHz  |         |                        |

Table 7.3A.3.2.1-2: void

7.3A.3.2.2 Void

7.3A.3.2.3  $\Delta R_{IB,c}$  for three bandsTable 7.3A.3.2.3-1:  $\Delta R_{IB,c}$  due to CA (three bands)

| Inter-band CA combination | NR Band | $\Delta R_{IB,c}$ (dB) |
|---------------------------|---------|------------------------|
| CA_n1-n3-n8               | n1      | 0.2                    |
|                           | n3      | 0.2                    |
|                           | n8      | 0.5                    |
| CA_n1-n3-n28              | n28     | 0.2                    |
| CA_n1-n3-n41              | n41     | 0 <sup>5</sup>         |
|                           |         | 0.5 <sup>6</sup>       |
| CA_n1-n3-n78              | n1      | 0.2                    |
|                           | n3      | 0.2                    |
|                           | n78     | 0.5                    |
| CA_n1-n3-n77              | n1      | 0.2                    |
|                           | n3      | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n1-n3-n79              | n79     | 0.5                    |
| CA_n1-n5-n28              | n5      | 0.2                    |
|                           | n28     | 0.2                    |
| CA_n1-n5-n78              | n1      | 0.2                    |
|                           | n5      | 0.2                    |
|                           | n78     | 0.5                    |
| CA_n1-n7-n8               | n8      | 0.2                    |
| CA_n1-n7-n28              | n28     | 0.2                    |
| CA_n1-n7-n40              | n7      | 0.3                    |
|                           | n40     | 0.8                    |
| CA_n1-n7-n78              | n1      | 0.2                    |
|                           | n7      | 0.2                    |
|                           | n78     | 0.5                    |
| CA_n1-n7-n79              | n1      | 0.2                    |
|                           | n7      | 0.2                    |
|                           | n79     | 0.5                    |
| CA_n1-n8-n28              | n8      | 0.2                    |
|                           | n28     | 0.2                    |
| CA_n1-n8-n40              | n8      | 0.2                    |
|                           | n40     | 0.5                    |
| CA_n1-n8-n77              | n8      | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n1-n8-n78              | n8      | 0.2                    |
|                           | n78     | 0.5                    |
| CA_n1-n8-n79              | n8      | 0.2                    |
|                           | n79     | 0.5                    |
| CA_n1-n18-n77             | n77     | 0.5                    |
| CA_n1-n20-n67             | n20     | 0.2                    |
|                           | n67     | 0.2                    |
| CA_n1-n20-n78             | n78     | 0.5                    |
| CA_n1-n28-n38             | n28     | 0.2                    |
| CA_n1-n28-n40             | n28     | 0.2                    |



| Inter-band CA combination | NR Band | $\Delta R_{IB,c}$ (dB) |
|---------------------------|---------|------------------------|
| CA_n1-n28-n41             | n28     | 0.2                    |
| CA_n1-n28-n77             | n1      | 0.2                    |
|                           | n28     | 0.2                    |
|                           | n77     | 0.5                    |
|                           |         |                        |
| CA_n1-n28-n78             | n28     | 0.2                    |
|                           | n78     | 0.5                    |
| CA_n1-n38-n78             | n78     | 0.5                    |
| CA_n1-n40-n78             | n78     | 0.5                    |
| CA_n1-n41-n77             | n1      | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n1-n77-n79             | n1      | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n1-n78-n79             | n78     | 0.5                    |
| CA_n2-n5-n30              | n2      | 0.4                    |
|                           | n30     | 0.5                    |
| CA_n2-n5-n48              | n2      | 0.2                    |
|                           | n48     | 0.5                    |
| CA_n2-n5-n66              | n2      | 0.3                    |
|                           | n66     | 0.3                    |
| CA_n2-n5-n77              | n2      | 0.2                    |
|                           | n5      | 0.5                    |
|                           | n77     | 0.5                    |
| CA_n2-n12-n30             | n2      | 0.4                    |
|                           | n30     | 0.5                    |
| CA_n2-n12-n66             | n2      | 0.3                    |
|                           | n12     | 0.5                    |
|                           | n66     | 0.3                    |
| CA_n2-n12-n77             | n2      | 0.2                    |
|                           | n12     | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n2-n14-n30             | n2      | 0.3                    |
|                           | n30     | 0.3                    |
| CA_n2-n14-n66             | n2      | 0.3                    |
|                           | n66     | 0.3                    |
| CA_n2-n14-n77             | n2      | 0.2                    |
|                           | n14     | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n2-n29-n30             | n2      | 0.3                    |
|                           | n30     | 0.3                    |
| CA_n2-n29-n66             | n2      | 0.3                    |
|                           | n66     | 0.3                    |
| CA_n2-n29-n77             | n2      | 0.2                    |
|                           | n29     | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n2-n30-n66             | n2      | 0.4                    |
|                           | n30     | 0.5                    |
|                           | n66     | 0.4                    |
| CA_n2-n30-n77             | n2      | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n2-n48-n66             | n2      | 0.3                    |
|                           | n48     | 0.5                    |
|                           | n66     | 0.3                    |
| CA_n2-n48-n77             | n2      | 0.2                    |
|                           | n48     | 0.5                    |
|                           | n77     | 0.5                    |
| CA_n2-n66-n77             | n2      | 0.2                    |
|                           | n66     | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n2-n66-n78             | n2      | 0.3                    |
|                           | n66     | 0.3                    |
|                           | n78     | 0.5                    |
| CA_n3-n5-n28              | n5      | 0.2                    |
|                           | n28     | 0.1                    |

| Inter-band CA combination | NR Band | $\Delta R_{IB,c}$ (dB)           |
|---------------------------|---------|----------------------------------|
| CA_n3-n7-n8               | n8      | 0.2                              |
| CA_n3-n7-n78              | n3      | 0.2                              |
|                           | n7      | 0.2                              |
|                           | n78     | 0.5                              |
|                           |         |                                  |
| CA_n3-n8-n28              | n8      | 0.2                              |
|                           | n28     | 0.1                              |
| CA_n3-n8-n77              | n3      | 0.2                              |
|                           | n8      | 0.2                              |
|                           | n77     | 0.5                              |
| CA_n3-n8-n41              | n41     | 0 <sup>1</sup>                   |
|                           |         | 0.5 <sup>2</sup>                 |
| CA_n3-n5-n78              | n3      | 0.2                              |
|                           | n5      | 0.2                              |
|                           | n78     | 0.5                              |
| CA_n3-n8-n78              | n3      | 0.2                              |
|                           | n8      | 0.2                              |
|                           | n78     | 0.5                              |
| CA_n3-n18-n41             | n41     | 0 <sup>1</sup> /0.5 <sup>2</sup> |
| CA_n3-n18-n77             | n3      | 0.2                              |
|                           | n77     | 0.5                              |
| CA_n3-n20-n67             | n20     | 0.1                              |
|                           | n67     | 0.1                              |
| CA_n3-n20-n78             | n3      | 0.2                              |
|                           | n78     | 0.5                              |
| CA_n3-n28-n41             | n41     | 0 <sup>1</sup> /0.5 <sup>2</sup> |
| CA_n3-n28-n77             | n3      | 0.2                              |
|                           | n28     | 0.2                              |
|                           | n77     | 0.5                              |
| CA_n3-n28-n78             | n28     | 0.2                              |
|                           | n78     | 0.5                              |
| CA_n3-n28-n79             | n28     | 0.2                              |
|                           | n79     | 0.5                              |
| CA_n3-n77-n79             | n3      | 0.2                              |
|                           | n77     | 0.5                              |
| CA_n3-n40-n41             | n41     | 0 <sup>1,3</sup>                 |
|                           |         | 0.5 <sup>2,3</sup>               |
| CA_n3-n41-n77             | n3      | 0.2                              |
|                           | n41     | 0 <sup>1</sup> /0.5 <sup>2</sup> |
|                           | n77     | 0.5                              |
| CA_n3-n41-n78             | n3      | 0.2                              |
|                           | n41     | 0 <sup>1</sup> /0.5 <sup>2</sup> |
|                           | n78     | 0.5                              |
| CA_n3-n41-n79             | n41     | 0.5                              |
|                           | n79     | 0.5                              |
| CA_n5-n7-n28              | n28     | 0.2                              |
| CA_n5-n7-n78              | n5      | 0.2                              |
|                           | n7      | 0.2                              |
|                           | n78     | 0.5                              |
| CA_n5-n12-n77             | n5      | 0.5                              |
|                           | n12     | 0.3                              |
|                           | n77     | 0.5                              |
| CA_n5-n14-n77             | n5      | 0.2                              |
|                           | n14     | 0.2                              |
|                           | n77     | 0.5                              |
| CA_n5-n25-n77             | n5      | 0.2                              |
|                           | n25     | 0.2                              |
|                           | n77     | 0.5                              |
| CA_n5-n25-n78             | n5      | 0.2                              |
|                           | n25     | 0.2                              |
|                           | n78     | 0.5                              |
| CA_n5-n29-n77             | n5      | 0.5                              |
|                           | n29     | 0.3                              |
|                           | n77     | 0.5                              |

| Inter-band CA combination | NR Band | $\Delta R_{IB,c}$ (dB) |
|---------------------------|---------|------------------------|
| CA_n5-n30-n66             | n30     | 0.5                    |
|                           | n66     | 0.4                    |
| CA_n5-n30-n77             | n5      | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n5-n40-n78             | n5      | 0.2                    |
|                           | n40     | 0.4                    |
|                           | n78     | 0.5                    |
| CA_n5-n48-n66             | n48     | 0.5                    |
|                           | n66     | 0.2                    |
| CA_n5-n48-n77             | n5      | 0.2                    |
|                           | n48     | 0.5                    |
|                           | n77     | 0.5                    |
| CA_n5-n66-n77             | n5      | 0.2                    |
|                           | n66     | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n5-n66-n78             | n5      | 0.5                    |
|                           | n66     | 0.2                    |
|                           | n78     | 0.5                    |
| CA_n7-n8-n28              | n8      | 0.2                    |
|                           | n28     | 0.1                    |
| CA_n7-n8-n40              | n8      | 0.2                    |
|                           | n40     | 0.5                    |
| CA_n7-n8-n78              | n8      | 0.2                    |
|                           | n78     | 0.5                    |
| CA_n7-n25-n66             | n7      | 0.5                    |
|                           | n25     | 0.3                    |
|                           | n66     | 0.5                    |
| CA_n7-n25-n77             | n7      | 0.5                    |
|                           | n25     | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n7-n25-n78             | n7      | 0.5                    |
|                           | n25     | 0.2                    |
|                           | n78     | 0.5                    |
| CA_n7-n28-n78             | n78     | 0.5                    |
| CA_n7-n46-n78             | n7      | 0.5                    |
|                           | n78     | 0.5                    |
| CA_n7-n66-n77             | n7      | 0.5                    |
|                           | n66     | 0.5                    |
|                           | n77     | 0.5                    |
| CA_n7-n66-n78             | n7      | 0.5                    |
|                           | n66     | 0.5                    |
|                           | n78     | 0.5                    |
| CA_n8-n28-n78             | n8      | 0.2                    |
|                           | n28     | 0.2                    |
|                           | n78     | 0.5                    |
| CA_n8-n39-n41             | n39     | 0.2 <sup>4</sup>       |
|                           | n41     | 0.2 <sup>4</sup>       |
| CA_n8A-n40A-n78A          | n8      | 0.2                    |
|                           | n40     | 0.4                    |
|                           | n78     | 0.5                    |
| CA_n8-n41-n79             | n41     | 0.5                    |
|                           | n79     | 0.5                    |
| CA_n8-n78-n79             | n8      | 0.2                    |
|                           | n78     | 0.5                    |
|                           | n79     | 0.5                    |
| CA_n12-n30-n66            | n12     | 0.5                    |
|                           | n30     | 0.5                    |
|                           | n66     | 0.4                    |
| CA_n12-n30-n77            | n12     | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n12-n66-n77            | n12     | 0.5                    |
|                           | n66     | 0.5                    |

| Inter-band CA combination | NR Band | $\Delta R_{IB,c}$ (dB) |
|---------------------------|---------|------------------------|
| CA_n13-n25-n66            | n77     | 0.5                    |
|                           | n25     | 0.3                    |
|                           | n66     | 0.3                    |
| CA_n13-n25-n77            | n25     | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n13-n66-n77            | n13     | 0.3                    |
|                           | n66     | 0.3                    |
|                           | n77     | 0.5                    |
| CA_n14-n30-n66            | n30     | 0.5                    |
|                           | n66     | 0.4                    |
| CA_n14-n30-n77            | n14     | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n14-n66-n77            | n14     | 0.2                    |
|                           | n66     | 0.5                    |
|                           | n77     | 0.5                    |
| CA_n18-n28-n77            | n77     | 0.5                    |
| CA_n18-n41-n77            | n77     | 0.5                    |
| CA_n20-n28-n78            | n28     | 0.2                    |
|                           | n78     | 0.5                    |
| CA_n24-n41-n48            | n48     | 0.5                    |
| CA_n24-n41-n77            | n24     | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n24-n48-n77            | n24     | 0.2                    |
|                           | n48     | 0.5                    |
|                           | n77     | 0.5                    |
| CA_n25-n29-n66            | n25     | 0.3                    |
|                           | n66     | 0.3                    |
| CA_n25-n38-n78            | n25     | 0.2                    |
|                           | n38     | 0.4                    |
|                           | n78     | 0.5                    |
| CA_n25-n41-n66            | n25     | 0.3                    |
|                           | n41     | 0.5 <sup>5</sup>       |
|                           |         | 1 <sup>6</sup>         |
|                           | n66     | 0.3                    |
| CA_n25-n41-n71            | n71     | 0.2                    |
| CA_n25-n41-n78            | n25     | 0.2                    |
|                           | n41     | 0.5                    |
|                           | n78     | 0.5                    |
| CA_n25-n48-n66            | n25     | 0.3                    |
|                           | n48     | 0.5                    |
|                           | n66     | 0.3                    |
| CA_n25-n66-n71            | n25     | 0.3                    |
|                           | n66     | 0.3                    |
|                           | n71     | 0.3                    |
| CA_n25-n66-n78            | n25     | 0.3                    |
|                           | n66     | 0.3                    |
|                           | n78     | 0.5                    |
| CA_n25-n66-n77            | n25     | 0.3                    |
|                           | n66     | 0.3                    |
|                           | n77     | 0.5                    |
| CA_n25-n71-n77            | n25     | 0.2                    |
|                           | n71     | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n25-n71-n78            | n25     | 0.2                    |
|                           | n71     | 0.3                    |
|                           | n78     | 0.5                    |
| CA_n28-n38-n78            | n28     | 0.2                    |
|                           | n78     | 0.5                    |
| CA_n28-n39-n40            | n39     | 0.3                    |
|                           | n40     | 0.3                    |
| CA_n28-n39-n41            | n39     | 0.2                    |
|                           | n41     | 0.2                    |
| CA_n28-n39-n79            | n28     | 0.2                    |

| Inter-band CA combination | NR Band | $\Delta R_{IB,c}$ (dB) |
|---------------------------|---------|------------------------|
| CA_n28-n40-n78            | n79     | 0.5                    |
|                           | n78     | 0.5                    |
| CA_n28-n40-n79            | n28     | 0.2                    |
|                           | n79     | 0.5                    |
| CA_n28-n41-n77            | n28     | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n28-n41-n78            | n28     | 0.2                    |
|                           | n78     | 0.5                    |
| CA_n28-n41-n79            | n28     | 0.2                    |
|                           | n41     | 0.5                    |
|                           | n79     | 0.5                    |
| CA_n28-n46-n78            | n28     | 0.2                    |
|                           | n78     | 0.5                    |
| CA_n28-n77-n79            | n28     | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n28-n78-n79            | n28     | 0.2                    |
|                           | n78     | 0.5                    |
| CA_n29-n30-n66            | n30     | 0.5                    |
|                           | n66     | 0.4                    |
| CA_n29-n30-n77            | n29     | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n29-n66-n77            | n29     | 0.5                    |
|                           | n66     | 0.5                    |
|                           | n77     | 0.5                    |
| CA_n30-n66-n77            | n30     | 0.5                    |
|                           | n66     | 0.4                    |
|                           | n77     | 0.5                    |
| CA_n39-n40-n79            | n39     | 0.3                    |
|                           | n40     | 0.3                    |
|                           | n79     | 0.5                    |
| CA_n39-n41-n79            | n39     | 0.3 <sup>4</sup>       |
|                           | n41     | 0.3 <sup>4</sup>       |
|                           | n79     | 0.8                    |
| CA_n40-n41-n79            | n40     | 0 <sup>8</sup>         |
|                           | n41     | 0.5 <sup>8</sup>       |
|                           | n79     | 0.5                    |
| CA_n41-n66-n71            | n41     | 0.5 <sup>1</sup>       |
|                           |         | 1 <sup>2</sup>         |
|                           | n66     | 0.5                    |
| CA_n41-n66-n77            | n41     | 0.2                    |
|                           | n66     | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n41-n66-n78            | n41     | 0.2                    |
|                           | n66     | 0.2                    |
|                           | n78     | 0.5                    |
| CA_n41-n70-n78            | n41     | 0.2                    |
|                           | n70     | 0.2                    |
|                           | n78     | 0.5                    |
| CA_n41-n71-n77            | n71     | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n41-n71-n78            | n71     | 0.2                    |
|                           | n78     | 0.5                    |
| CA_n46-n48-n96            | n46     | 0.5                    |
|                           | n48     | 0.5                    |
|                           | n96     | 0.6                    |
| CA_n48-n66-n70            | n48     | 0.5                    |
|                           | n66     | 0.2                    |
|                           | n70     | 0.2                    |
| CA_n48-n66-n71            | n48     | 0.2                    |
|                           | n66     | 0.2                    |
|                           | n71     | 0.2                    |
| CA_n48-n66-n77            | n48     | 0.5                    |
|                           | n66     | 0.2                    |

| Inter-band CA combination                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | NR Band | $\Delta R_{IB,c}$ (dB) |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------------------|
| CA_n48-n70-n71                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | n77     | 0.5                    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | n48     | 0.2                    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | n70     | 0.2                    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | n71     | 0.2                    |
| CA_n66-n71-n77                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | n66     | 0.2                    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | n71     | 0.2                    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | n77     | 0.5                    |
| CA_n66-n71-n78                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | n66     | 0.2                    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | n71     | 0.2                    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | n78     | 0.5                    |
| NOTE 1: Applicable for the frequency range of 2515-2690 MHz.<br>NOTE 2: Applicable for the frequency range of 2496-2515 MHz.<br>NOTE 3: Only applicable for UE supporting inter-band carrier aggregation without simultaneous Rx/Tx among band 40 and 41.<br>NOTE 4: Applicable for UE supporting inter-band carrier aggregation without simultaneous Rx/Tx between n39 and n41.<br>NOTE 5: The requirement is applied for UE transmitting on the frequency range of 2545 - 2690 MHz.<br>NOTE 6: The requirement is applied for UE transmitting on the frequency range of 2496 - 2545 MHz.<br>NOTE 7: Void.<br>NOTE 8: Void. |         |                        |

#### 7.3A.3.2.4 $\Delta R_{IB,c}$ for four bands

**Table 7.3A.3.2.4-1:  $\Delta R_{IB,c}$  due to CA (four bands)**

| Inter-band CA combination | NR Band | $\Delta R_{IB,c}$ (dB) |
|---------------------------|---------|------------------------|
| CA_n1-n3-n5-n78           | n1      | 0.2                    |
|                           | n3      | 0.2                    |
|                           | n78     | 0.5                    |
| CA_n1-n3-n7-n28           | n28     | 0.2                    |
| CA_n1-n3-n7-n78           | n1      | 0.3                    |
|                           | n3      | 0.3                    |
|                           | n7      | 0.3                    |
|                           | n78     | 0.5                    |
| CA_n1-n3-n8-n77           | n1      | 0.2                    |
|                           | n3      | 0.2                    |
|                           | n8      | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n1-n3-n8-n78           | n1      | 0.2                    |
|                           | n3      | 0.2                    |
|                           | n8      | 0.2                    |
|                           | n78     | 0.5                    |
| CA_n1-n3-n18-n28          | n28     | 0.2                    |
| CA_n1-n3-n18-n41          | n41     | 0 <sup>5</sup>         |
|                           |         | 0.5 <sup>6</sup>       |
| CA_n1-n3-n18-n77          | n1      | 0.2                    |
|                           | n3      | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n1-n3-n28-n41          | n28     | 0.2                    |
|                           |         | 0 <sup>5</sup>         |
|                           |         | 0.5 <sup>6</sup>       |
| CA_n1-n3-n28-n77          | n1      | 0.2                    |
|                           |         | 0.2                    |

| Inter-band CA combination | NR Band | $\Delta R_{IB,c}$ (dB) |
|---------------------------|---------|------------------------|
| CA_n1-n3-n28-n78          | n28     | 0.2                    |
|                           | n77     | 0.5                    |
|                           | n1      | 0.2                    |
| CA_n1-n3-n28-n79          | n3      | 0.2                    |
|                           | n28     | 0.2                    |
|                           | n78     | 0.5                    |
| CA_n1-n3-n28-n79          | n28     | 0.2                    |
|                           | n79     | 0.5                    |
| CA_n1-n3-n41-n77          | n1      | 0.2                    |
|                           | n3      | 0.2                    |
|                           | n41     | 0 <sup>5</sup>         |
|                           | n77     | 0.5 <sup>6</sup>       |
| CA_n1-n3-n77-n79          | n1      | 0.2                    |
|                           | n3      | 0.2                    |
|                           | n77     | 0.5                    |
|                           | n79     | 0.5                    |
| CA_n1-n5-n7-n78           | n1      | 0.2                    |
|                           | n5      | 0.2                    |
|                           | n7      | 0.2                    |
|                           | n78     | 0.5                    |
| CA_n1-n7-n8-n40           | n8      | 0.3                    |
|                           | n40     | 0.8                    |
| CA_n1-n7-n8-n78           | n1      | 0.2                    |
|                           | n7      | 0.2                    |
|                           | n8      | 0.2                    |
|                           | n78     | 0.5                    |
| CA_n1-n7-n28-n78          | n1      | 0.2                    |
|                           | n7      | 0.2                    |
| CA_n1-n7-n40-n78          | n1      | 0.2                    |
|                           | n40     | 0.4                    |
|                           | n78     | 0.5                    |
| CA_n1-n8-n40-n78          | n1      | 0.2                    |
|                           | n40     | 0.4                    |
|                           | n78     | 0.5                    |
| CA_n1-n8-n78-n79          | n1      | 0.3                    |
|                           | n8      | 0.3                    |
|                           | n78     | 0.5                    |
| CA_n1-n18-n28-n41         | n1      | 0.2                    |
|                           | n28     | 0.2                    |
| CA_n1-n18-n28-n77         | n1      | 0.2                    |
|                           | n28     | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n1-n18-n41-n77         | n1      | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n1-n28-n40-n78         | n28     | 0.2                    |
|                           | n78     | 0.5                    |
| CA_n1-n28-n41-n77         | n1      | 0.2                    |
|                           | n28     | 0.2                    |
|                           | n77     | 0.5                    |

| Inter-band CA combination | NR Band | $\Delta R_{IB,c}$ (dB) |
|---------------------------|---------|------------------------|
| CA_n1-n28-n77-n79         | n1      | 0.2                    |
|                           | n28     | 0.2                    |
|                           | n77     | 0.5                    |
|                           | n79     | 0.5                    |
| CA_n2-n5-n30-n66          | n2      | 0.4                    |
|                           | n30     | 0.5                    |
|                           | n66     | 0.4                    |
| CA_n2-n5-n30-n77          | n2      | 0.2                    |
|                           | n5      | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n2-n5-n48-n66          | n2      | 0.2                    |
|                           | n48     | 0.5                    |
|                           | n66     | 0.2                    |
| CA_n2-n5-n48-n77          | n2      | 0.2                    |
|                           | n48     | 0.5                    |
|                           | n77     | 0.5                    |
| CA_n2-n5-n66-n77          | n2      | 0.3                    |
|                           | n66     | 0.3                    |
|                           | n77     | 0.5                    |
| CA_n2-n12-n30-n66         | n2      | 0.4                    |
|                           | n12     | 0.5                    |
|                           | n30     | 0.5                    |
|                           | n66     | 0.4                    |
| CA_n2-n12-n30-n77         | n2      | 0.2                    |
|                           | n12     | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n2-n12-n66-n77         | n2      | 0.2                    |
|                           | n12     | 0.5                    |
|                           | n66     | 0.5                    |
|                           | n77     | 0.5                    |
| CA_n2-n14-n30-n66         | n2      | 0.4                    |
|                           | n30     | 0.5                    |
|                           | n66     | 0.4                    |
| CA_n2-n14-n30-n77         | n2      | 0.2                    |
|                           | n14     | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n2-n14-n66-n77         | n2      | 0.2                    |
|                           | n14     | 0.2                    |
|                           | n66     | 0.5                    |
|                           | n77     | 0.5                    |
| CA_n2-n29-n30-n66         | n2      | 0.4                    |
|                           | n30     | 0.5                    |
|                           | n66     | 0.4                    |
| CA_n2-n29-n30-n77         | n2      | 0.2                    |
|                           | n29     | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n2-n29-n66-n77         | n2      | 0.2                    |
|                           | n29     | 0.5                    |
|                           | n66     | 0.5                    |



| Inter-band CA combination | NR Band | $\Delta R_{IB,c}$ (dB)           |
|---------------------------|---------|----------------------------------|
| CA_n2-n48-n66-n77         | n77     | 0.5                              |
|                           | n2      | 0.3                              |
|                           | n48     | 0.5                              |
|                           | n66     | 0.3                              |
|                           | n77     | 0.5                              |
| CA_n2-n66-n71-n78         | n2      | 0.3                              |
|                           | n66     | 0.5                              |
|                           | n78     | 0.5                              |
| CA_n3-n5-n7-n78           | n3      | 0.2                              |
|                           | n5      | 0.2                              |
|                           | n7      | 0.2                              |
|                           | n78     | 0.5                              |
| CA_n3-n7-n28-n78          | n3      | 0.2                              |
|                           | n7      | 0.2                              |
|                           | n28     | 0.2                              |
|                           | n78     | 0.5                              |
| CA_n3-n18-n28-n41         | n41     | 0 <sup>5</sup>                   |
|                           |         | 0.5 <sup>6</sup>                 |
| CA_n3-n18-n28-n77         | n3      | 0.2                              |
|                           | n28     | 0.2                              |
|                           | n77     | 0.5                              |
| CA_n3-n18-n41-n77         | n3      | 0.2                              |
|                           | n41     | 0 <sup>5</sup>                   |
|                           |         | 0.5 <sup>6</sup>                 |
|                           | n77     | 0.5                              |
| CA_n3-n28-n41-n77         | n3      | 0.5                              |
|                           | n28     | 0.2                              |
|                           | n41     | 0 <sup>1</sup> /0.5 <sup>2</sup> |
|                           | n77     | 0.5                              |
| CA_n3-n28-n41-n78         | n3      | 0.5                              |
|                           | n28     | 0.2                              |
|                           | n41     | 0 <sup>1</sup> /0.5 <sup>2</sup> |
|                           | n78     | 0.5                              |
| CA_n3-n28-n77-n79         | n3      | 0.2                              |
|                           | n28     | 0.2                              |
|                           | n77     | 0.5                              |
|                           | n79     | 0.5                              |
| CA_n5-n25-n66-n77         | n5      | 0.5                              |
|                           | n25     | 0.3                              |
|                           | n66     | 0.3                              |
|                           | n77     | 0.5                              |
| CA_n5-n25-n66-n78         | n5      | 0.5                              |
|                           | n25     | 0.3                              |
|                           | n66     | 0.3                              |
|                           | n78     | 0.5                              |
| CA_n5-n30-n66-n77         | n5      | 0.2                              |
|                           | n30     | 0.4                              |
|                           | n66     | 0.4                              |
|                           | n77     | 0.5                              |
| CA_n5-n48-n66-n77         | n5      | 0.2                              |
|                           | n48     | 0.5                              |

| Inter-band CA combination | NR Band | $\Delta R_{IB,c}$ (dB)             |
|---------------------------|---------|------------------------------------|
| CA_n7-n8-n40-n78          | n66     | 0.2                                |
|                           | n77     | 0.5                                |
|                           | n8      | 0.2                                |
| CA_n7-n25-n66-n77         | n40     | 0.4                                |
|                           | n78     | 0.5                                |
|                           | n7      | 0.5                                |
| CA_n7-n25-n66-n78         | n7      | 0.5                                |
|                           | n25     | 0.6                                |
|                           | n66     | 0.6                                |
|                           | n77     | 0.8                                |
| CA_n12-n30-n66-n77        | n7      | 0.5                                |
|                           | n25     | 0.6                                |
|                           | n66     | 0.6                                |
|                           | n78     | 0.8                                |
| CA_n13-n25-n66-n77        | n12     | 0.5                                |
|                           | n30     | 0.5                                |
|                           | n66     | 0.5                                |
|                           | n77     | 0.5                                |
| CA_n14-n30-n66-n77        | n13     | 0.3                                |
|                           | n25     | 0.3                                |
|                           | n66     | 0.3                                |
|                           | n77     | 0.5                                |
| CA_n18-n28-n41-n77        | n14     | 0.2                                |
|                           | n30     | 0.5                                |
|                           | n66     | 0.5                                |
|                           | n77     | 0.5                                |
| CA_n25-n38-n66-n78        | n28     | 0.2                                |
|                           | n41     | 0 <sup>5</sup>                     |
|                           |         | 0.5 <sup>6</sup>                   |
|                           | n77     | 0.5                                |
| CA_n25-n41-n66-n71        | n25     | 0.3                                |
|                           | n38     | 0.4                                |
|                           | n66     | 0.3                                |
|                           | n78     | 0.5                                |
| CA_n25-n41-n66-n77        | n25     | 0.3                                |
|                           | n41     | 0.5                                |
|                           | n66     | 0.5                                |
|                           | n77     | 0.5                                |
| CA_n25-n41-n66-n78        | n25     | 0.3                                |
|                           | n41     | 0.5 <sup>3</sup> /1.0 <sup>4</sup> |
|                           | n66     | 0.3                                |
|                           | n77     | 0.5                                |
| CA_n25-n41-n71-n77        | n25     | 0.3                                |
|                           | n41     | 0.5 <sup>5</sup> /1.0 <sup>6</sup> |
|                           | n66     | 0.3                                |
|                           | n78     | 0.5                                |
| CA_n25-n41-n71-n78        | n71     | 0.2                                |
|                           | n77     | 0.5                                |
|                           | n71     | 0.2                                |
| CA_n25-n66-n71-n77        | n78     | 0.5                                |
|                           | n25     | 0.3                                |
|                           | n66     | 0.3                                |

| Inter-band CA combination | NR Band | $\Delta R_{IB,c}$ (dB) |
|---------------------------|---------|------------------------|
| CA_n25-n66-n71-n78        | n71     | 0.3                    |
|                           | n77     | 0.5                    |
|                           | n25     | 0.3                    |
|                           | n66     | 0.3                    |
|                           | n71     | 0.3                    |
| CA_n29-n30-n66-n77        | n78     | 0.5                    |
|                           | n29     | 0.5                    |
|                           | n30     | 0.5                    |
|                           | n66     | 0.5                    |
|                           | n77     | 0.5                    |
| CA_n41-n66-n70-n78        | n66     | 0.2                    |
|                           | n70     | 0.2                    |
|                           | n78     | 0.5                    |
|                           | n41     | 0.5                    |
| CA_n41-n66-n71-n77        | n41     | 0.5                    |
|                           | n66     | 0.5                    |
|                           | n71     | 0.2                    |
|                           | n77     | 0.5                    |
| CA_n41-n66-n71-n78        | n41     | 0.5                    |
|                           | n66     | 0.5                    |
|                           | n71     | 0.2                    |
|                           | n78     | 0.5                    |

NOTE 1: Applicable for the frequency range of 2515-2690 MHz.  
NOTE 2: Applicable for the frequency range of 2496-2515 MHz  
NOTE 5: The requirement is applied for UE transmitting on the frequency range of 2545 - 2690 MHz.  
NOTE 6: The requirement is applied for UE transmitting on the frequency range of 2496 - 2545 MHz

### 7.3A.3.2.5 $\Delta R_{IB,c}$ for five bands

**Table 7.3A.3.2.5-1:  $\Delta R_{IB,c}$  due to CA (five bands)**

| Inter-band CA combination | NR Band | $\Delta R_{IB,c}$ (dB) |
|---------------------------|---------|------------------------|
| CA_n1-n3-n5-n7-n78        | n1      | 0.2                    |
|                           | n3      | 0.2                    |
|                           | n5      | 0.2                    |
|                           | n7      | 0.2                    |
|                           | n78     | 0.5                    |
| CA_n1-n3-n7-n28-n78       | n1      | 0.2                    |
|                           | n3      | 0.2                    |
|                           | n7      | 0.2                    |
|                           | n28     | 0.2                    |
|                           | n78     | 0.5                    |
| CA_n2-n5-n48-n66-n77      | n2      | 0.2                    |
|                           | n48     | 0.5                    |
|                           | n66     | 0.2                    |
|                           | n77     | 0.5                    |

7.3A.3.3  $\Delta R_{IB,c}$  for Intra-band CATable 7.3A.3.3-1:  $\Delta R_{IB,c}$  due to Intra-band contiguous CA

| Intra-band CA combination | Operating Band | $\Delta R_{IB,c}$ (dB) |
|---------------------------|----------------|------------------------|
| CA_n96E                   | n96            | 0.5                    |

Table 7.3A.3.3-2:  $\Delta R_{IB,c}$  due to Intra-band non-contiguous CA

| CA configuration | SCS (PCC/SCC) (kHz) | Aggregated channel bandwidth (PCC+SCC) | $\Delta R_{IBNC}$ (dB) | Duplex mode |
|------------------|---------------------|----------------------------------------|------------------------|-------------|
| CA_n96(4A)       | 15/30/60            | 320MHz                                 | 0.5                    | TDD         |

## 7.3A.4 Reference sensitivity exceptions due to UL harmonic interference for CA

Sensitivity degradation is allowed for different combinations of UL configurations and DL channel bandwidths if a band in frequency range 1 is impacted by UL harmonic interference from another band which belongs to NR band in frequency range 1 of the same downlink CA configuration. Reference sensitivity exceptions and uplink/downlink configurations due to UL harmonic from a PC3 aggressor NR UL band for either single band uplink or PC3 or PC2 CA are specified in Table 7.3A.4-1. For these exceptions, only the listed test points in Table 7.3A.4-1 are needed to be tested.

Table 7.3A.4-1: Reference sensitivity exceptions and uplink/downlink configurations due to UL harmonic from a PC3 aggressor NR UL band for NR DL CA FR1

| UL band | DL band | UL BW | SCS of UL band | UL RB Allocation | DL BW            | MSD  | UL/DL fc condition | UL/DL harmonic order |
|---------|---------|-------|----------------|------------------|------------------|------|--------------------|----------------------|
|         |         | (MHz) | (kHz)          | $L_{CRB}$        | (MHz)            | (dB) |                    |                      |
| n1      | n77     | 5     | 15             | 25 (RBstart=0)   | 10               | 23.9 | NOTE 2             | UL2/DL1 direct-hit   |
| n1      | n77     | 20    | 15             | 100 (RBstart=0)  | 100              | 13.8 | NOTE 2             | UL2/DL1 direct-hit   |
| n1      | n77     | 5     | 15             | 25 (RBstart=0)   | 10               | 1.1  | NOTE 6             | UL2/DL1 near-miss    |
| n2      | n48     | 5     | 15             | 25 (RBstart=0)   | 5                | 27.1 | NOTE 2             | UL2/DL1 direct-hit   |
| n2      | n48     | 10    | 15             | 50 (RBstart=0)   | 100 <sup>7</sup> | 13.8 | NOTE 2             | UL2/DL1 direct-hit   |
| n2      | n48     | 5     | 15             | 25 (RBstart=0)   | 10               | 1.9  | NOTE 6             | UL2/DL1 near-miss    |
| n2      | n77     | 5     | 15             | 25 (RBstart=0)   | 10               | 23.9 | NOTE 2             | UL2/DL1 direct-hit   |
| n2      | n77     | 10    | 15             | 50 (RBstart=0)   | 100              | 13.8 | NOTE 2             | UL2/DL1 direct-hit   |
| n2      | n77     | 5     | 15             | 25 (RBstart=0)   | 10               | 1.1  | NOTE 6             | UL2/DL1 near-miss    |
| n2      | n78     | 5     | 15             | 25 (RBstart=0)   | 10               | 23.9 | NOTE 2             | UL2/DL1 direct-hit   |
| n2      | n78     | 10    | 15             | 50 (RBstart=0)   | 100              | 13.8 | NOTE 2             | UL2/DL1 direct-hit   |
| n2      | n78     | 5     | 15             | 25 (RBstart=0)   | 10               | 1.1  | NOTE 6             | UL2/DL1 near-miss    |
| n3      | n77     | 5     | 15             | 25 (RBstart=0)   | 10               | 23.9 | NOTE 2             | UL2/DL1 direct-hit   |
| n3      | n77     | 10    | 15             | 50 (RBstart=0)   | 100              | 13.8 | NOTE 2             | UL2/DL1 direct-hit   |

| UL band | DL band          | UL BW | SCS of UL band | UL RB Allocation | DL BW | MSD  | UL/DL fc condition | UL/DL harmonic order |
|---------|------------------|-------|----------------|------------------|-------|------|--------------------|----------------------|
|         |                  | (MHz) | (kHz)          | L <sub>CRB</sub> | (MHz) | (dB) |                    |                      |
| n3      | n77              | 5     | 15             | 25 (RBstart=0)   | 10    | 1.1  | NOTE 6             | UL2/DL1 near-miss    |
| n3      | n78              | 5     | 15             | 25 (RBstart=0)   | 10    | 23.9 | NOTE 2             | UL2/DL1 direct-hit   |
| n3      | n78              | 10    | 15             | 50 (RBstart=0)   | 100   | 13.8 | NOTE 2             | UL2/DL1 direct-hit   |
| n3      | n78              | 5     | 15             | 25 (RBstart=0)   | 10    | 1.1  | NOTE 6             | UL2/DL1 near-miss    |
| n5      | n77 <sup>8</sup> | 5     | 15             | 16 (RBstart=0)   | 10    | 10.5 | NOTE 4             | UL4/DL1 direct-hit   |
| n5      | n77 <sup>8</sup> | 5     | 15             | 25 (RBstart=0)   | 100   | 1.4  | NOTE 4             | UL4/DL1 direct-hit   |
| n5      | n77 <sup>8</sup> | 5     | 15             | 16 (RBstart=0)   | 10    | 10.4 | NOTE 5             | UL5/DL1 direct-hit   |
| n5      | n77 <sup>8</sup> | 5     | 15             | 25 (RBstart=0)   | 100   | 0.7  | NOTE 5             | UL5/DL1 direct-hit   |
| n5      | n78              | 5     | 15             | 16 (RBstart=0)   | 10    | 10.5 | NOTE 4             | UL4/DL1 direct-hit   |
| n5      | n78              | 5     | 15             | 25 (RBstart=0)   | 100   | 1.4  | NOTE 4             | UL4/DL1 direct-hit   |
| n8      | n3 <sup>13</sup> | N/A   | N/A            | N/A              | N/A   | N/A  | NOTE 2             | UL2/DL1 direct-hit   |
| n8      | n7               | 5     | 15             | 8 (RBstart=0)    | 5     | 10   | NOTE 3             | UL3/DL1 direct-hit   |
| n8      | n7               | 5     | 15             | 25 (RBstart=0)   | 50    | 1.1  | NOTE 3             | UL3/DL1 direct-hit   |
| n8      | n41              | 5     | 15             | 16 (RBstart=0)   | 10    | 13   | NOTE 3             | UL3/DL1 direct-hit   |
| n8      | n41              | 5     | 15             | 25 (RBstart=0)   | 100   | 3.5  | NOTE 3             | UL3/DL1 direct-hit   |
| n8      | n77              | 5     | 15             | 16 (RBstart=0)   | 10    | 10.8 | NOTE 4             | UL4/DL1 direct-hit   |
| n8      | n77              | 5     | 15             | 25 (RBstart=0)   | 100   | 1.4  | NOTE 4             | UL4/DL1 direct-hit   |
| n8      | n78              | 5     | 15             | 16 (RBstart=0)   | 10    | 10.8 | NOTE 4             | UL4/DL1 direct-hit   |
| n8      | n78              | 5     | 15             | 25 (RBstart=0)   | 100   | 1.4  | NOTE 4             | UL4/DL1 direct-hit   |
| n8      | n79              | 5     | 15             | 16 (RBstart=0)   | 10    | 12.0 | NOTE 5             | UL5/DL1 direct-hit   |
| n8      | n79              | 5     | 15             | 25 (RBstart=0)   | 100   | 4.4  | NOTE 5             | UL5/DL1 direct-hit   |
| n12     | n48              | 5     | 15             | 10 (RBstart=0)   | 10    | 10.4 | NOTE 5             | UL5/DL1 direct-hit   |
| n12     | n48              | 5     | 15             | 25 (RBstart=0)   | 40    | 4.7  | NOTE 5             | UL5/DL1 direct-hit   |
| n12     | n66              | 5     | 15             | 8 (RBstart=0)    | 5     | 10   | NOTE 3             | UL3/DL1 direct-hit   |
| n12     | n66              | 5     | 15             | 20 (RBstart=0)   | 40    | 2.4  | NOTE 3             | UL3/DL1 direct-hit   |
| n12     | n77              | 5     | 15             | 10 (RBstart=0)   | 10    | 10.4 | NOTE 5             | UL5/DL1 direct-hit   |
| n12     | n77              | 5     | 15             | 20 (RBstart=0)   | 100   | 0.7  | NOTE 5             | UL5/DL1 direct-hit   |
| n13     | n77              | 5     | 15             | 10 (RBstart=0)   | 10    | 10.4 | NOTE 5             | UL5/DL1 direct-hit   |
| n13     | n77              | 5     | 15             | 20 (RBstart=0)   | 100   | 0.7  | NOTE 5             | UL5/DL1 direct-hit   |
| n14     | n77              | 5     | 15             | 10 (RBstart=0)   | 10    | 10.4 | NOTE 5             | UL5/DL1 direct-hit   |
| n14     | n77              | 5     | 15             | 20 (RBstart=0)   | 100   | 0.7  | NOTE 5             | UL5/DL1              |

| UL band | DL band           | UL BW | SCS of UL band | UL RB Allocation | DL BW            | MSD  | UL/DL fc condition | UL/DL harmonic order |
|---------|-------------------|-------|----------------|------------------|------------------|------|--------------------|----------------------|
|         |                   | (MHz) | (kHz)          | L <sub>CRB</sub> | (MHz)            | (dB) |                    |                      |
|         |                   |       |                |                  |                  |      |                    | direct-hit           |
| n18     | n77               | 5     | 15             | 16 (RBstart=0)   | 10               | 10.4 | NOTE 5             | UL5/DL1 direct-hit   |
| n18     | n77               | 5     | 15             | 25 (RBstart=0)   | 100              | 0.7  | NOTE 5             | UL5/DL1 direct-hit   |
| n20     | n78               | 5     | 15             | 16 (RBstart=0)   | 10               | 10.8 | NOTE 4             | UL4/DL1 direct-hit   |
| n20     | n78               | 5     | 15             | 25 (RBstart=0)   | 100              | 1.0  | NOTE 4             | UL4/DL1 direct-hit   |
| n24     | n77 <sup>12</sup> | N/A   | N/A            | N/A              | N/A              | N/A  | NOTE 2             | UL2/DL1 direct-hit   |
| n24     | n77 <sup>12</sup> | N/A   | N/A            | N/A              | N/A              | N/A  | NOTE 2             | UL2/DL1 direct-hit   |
| n25     | n48               | 5     | 15             | 25 (RBstart=0)   | 10               | 1.9  | NOTE 6             | UL2/DL1 near-miss    |
| n25     | n77               | 5     | 15             | 25 (RBstart=0)   | 10               | 23.9 | NOTE 2             | UL2/DL1 direct-hit   |
| n25     | n77               | 10    | 15             | 50 (RBstart=0)   | 100              | 13.8 | NOTE 2             | UL2/DL1 direct-hit   |
| n25     | n77               | 5     | 15             | 25 (RBstart=0)   | 10               | 1.1  | NOTE 6             | UL2/DL1 near-miss    |
| n25     | n78               | 5     | 15             | 25 (RBstart=0)   | 10               | 23.9 | NOTE 2             | UL2/DL1 direct-hit   |
| n25     | n78               | 10    | 15             | 50 (RBstart=0)   | 100              | 13.8 | NOTE 2             | UL2/DL1 direct-hit   |
| n25     | n78               | 5     | 15             | 25 (RBstart=0)   | 10               | 1.1  | NOTE 6             | UL2/DL1 near-miss    |
| n28     | n1                | 5     | 15             | 8 (RBstart=0)    | 5                | 10.2 | NOTE 3             | UL3/DL1 direct-hit   |
| n28     | n1                | 5     | 15             | 25 (RBstart=0)   | 50               | 1.1  | NOTE 3             | UL3/DL1 direct-hit   |
| n28     | n50               | 5     | 15             | 12 (RBstart=0)   | 5                | 23.0 | NOTE 2             | UL2/DL1 direct-hit   |
| n28     | n50               | 5     | 15             | 25 (RBstart=0)   | 80               | 10.8 | NOTE 2             | UL2/DL1 direct-hit   |
| n28     | n74               | 5     | 15             | 12 (RBstart=0)   | 5                | 23.1 | NOTE 2             | UL2/DL1 direct-hit   |
| n28     | n74               | 5     | 15             | 25 (RBstart=0)   | 20               | 16.8 | NOTE 2             | UL2/DL1 direct-hit   |
| n28     | n75               | 5     | 15             | 12 (RBstart=0)   | 5                | 28.1 | NOTE 2             | UL2/DL1 direct-hit   |
| n28     | n75               | 10    | 15             | 50 (RBstart=0)   | 50               | 18.7 | NOTE 2             | UL2/DL1 direct-hit   |
| n28     | n77               | 5     | 15             | 10 (RBstart=0)   | 10               | 10.4 | NOTE 5             | UL5/DL1 direct-hit   |
| n28     | n77               | 5     | 15             | 25 (RBstart=0)   | 100              | 0.7  | NOTE 5             | UL5/DL1 direct-hit   |
| n28     | n78               | 5     | 15             | 10 (RBstart=0)   | 10               | 10.4 | NOTE 5             | UL5/DL1 direct-hit   |
| n28     | n78               | 5     | 15             | 25 (RBstart=0)   | 100              | 0.7  | NOTE 5             | UL5/DL1 direct-hit   |
| n66     | n48               | 5     | 15             | 12 (RBstart=0)   | 5                | 27.1 | NOTE 2             | UL2/DL1 direct-hit   |
| n66     | n48               | 40    | 15             | 200 (RBstart=0)  | 100 <sup>7</sup> | 13.8 | NOTE 2             | UL2/DL1 direct-hit   |
| n66     | n48               | 5     | 15             | 12 (RBstart=0)   | 5                | 1.9  | NOTE 6             | UL2/DL1 near-miss    |
| n66     | n77               | 5     | 15             | 25 (RBstart=0)   | 10               | 23.9 | NOTE 2             | UL2/DL1 direct-hit   |
| n66     | n77               | 20    | 15             | 100 (RBstart=0)  | 100              | 13.8 | NOTE 2             | UL2/DL1 direct-hit   |

| UL band | DL band              | UL BW | SCS of UL band | UL RB Allocation | DL BW | MSD  | UL/DL fc condition | UL/DL harmonic order |
|---------|----------------------|-------|----------------|------------------|-------|------|--------------------|----------------------|
|         |                      | (MHz) | (kHz)          | L <sub>CRB</sub> | (MHz) | (dB) |                    |                      |
| n66     | n77                  | 5     | 15             | 25 (RBstart=0)   | 10    | 1.1  | NOTE 6             | UL2/DL1 near-miss    |
| n66     | n78                  | 5     | 15             | 25 (RBstart=0)   | 10    | 23.9 | NOTE 2             | UL2/DL1 direct-hit   |
| n66     | n78                  | 20    | 15             | 100 (RBstart=0)  | 100   | 13.8 | NOTE 2             | UL2/DL1 direct-hit   |
| n66     | n78                  | 5     | 15             | 25 (RBstart=0)   | 10    | 1.1  | NOTE 6             | UL2/DL1 near-miss    |
| n70     | n78                  | 5     | 15             | 25 (RBstart=0)   | 10    | 23.9 | NOTE 2             | UL2/DL1 direct-hit   |
| n70     | n78                  | 10    | 15             | 50 (RBstart=0)   | 100   | 13.8 | NOTE 2             | UL2/DL1 direct-hit   |
| n70     | n78                  | 5     | 15             | 25 (RBstart=0)   | 10    | 1.1  | NOTE 6             | UL2/DL1 near-miss    |
| n71     | n25 <sup>10,11</sup> | 5     | 15             | 8 (RBstart=0)    | 5     | 10   | NOTE 3             | UL3/DL1 direct-hit   |
| n71     | n25 <sup>10,11</sup> | 5     | 15             | 8 (RBstart=0)    | 40    | 2.1  | NOTE 3             | UL3/DL1 direct-hit   |
| n71     | n41                  | 5     | 15             | 16 (RBstart=0)   | 10    | 10.8 | NOTE 4             | UL4/DL1 direct-hit   |
| n71     | n41                  | 5     | 15             | 25 (RBstart=0)   | 100   | 1.4  | NOTE 4             | UL4/DL1 direct-hit   |
| n71     | n70                  | 5     | 15             | 8 (RBstart=0)    | 5     | 9.9  | NOTE 3             | UL3/DL1 direct-hit   |
| n71     | n70                  | 5     | 15             | 20 (RBstart=0)   | 25    | 4.1  | NOTE 3             | UL3/DL1 direct-hit   |
| n71     | n77                  | 5     | 15             | 10 (RBstart=0)   | 10    | 10.4 | NOTE 5             | UL5/DL1 direct-hit   |
| n71     | n78                  | 5     | 15             | 10 (RBstart=0)   | 10    | 10.4 | NOTE 5             | UL5/DL1 direct-hit   |
| n92     | n78                  | 5     | 15             | 16 (RBstart=0)   | 10    | 10.8 | NOTE 4             | UL4/DL1 direct-hit   |
| n92     | n78                  | 5     | 15             | 25 (RBstart=0)   | 100   | 1.0  | NOTE 4             | UL4/DL1 direct-hit   |

NOTE 1: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the aggressor (lower) band for which the 2<sup>nd</sup> / 3<sup>rd</sup> / 4<sup>th</sup> / 5<sup>th</sup> transmitter harmonic is within the downlink transmission bandwidth of a victim (higher) band.

NOTE 2: The requirements should be verified for UL NR ARFCN of the aggressor (lower) band (superscript LB) such that  $f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.2 \rfloor \cdot 0.1$  in MHz and  $F_{UL\_low}^{LB} + BW_{Channel}^{LB} / 2 \leq f_{UL}^{LB} \leq F_{UL\_high}^{LB} - BW_{Channel}^{LB} / 2$  with carrier frequency in the victim (higher) band in MHz and the channel bandwidth configured in the lower band.

NOTE 3: The requirements should be verified for UL NR ARFCN of the aggressor (lower) band (superscript LB) such that  $f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.3 \rfloor \cdot 0.1$  in MHz and  $F_{UL\_low}^{LB} + BW_{Channel}^{LB} / 2 \leq f_{UL}^{LB} \leq F_{UL\_high}^{LB} - BW_{Channel}^{LB} / 2$  with the carrier frequency in the victim (higher) band in MHz and the channel bandwidth configured in the low band.

NOTE 4: The requirements should be verified for UL NR-ARFCN of the aggressor (lower) band (superscript LB) such that  $f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.4 \rfloor \cdot 0.1$  in MHz and  $F_{UL\_low}^{LB} + BW_{Channel}^{LB} / 2 \leq f_{UL}^{LB} \leq F_{UL\_high}^{LB} - BW_{Channel}^{LB} / 2$  with  $f_{DL}^{HB}$  carrier frequency in the victim (higher) band in MHz and  $BW_{Channel}^{LB}$  the channel bandwidth configured in the lower band.

NOTE 5: The requirements should be verified for UL NR-ARFCN of the aggressor (lower) band (superscript LB) such that  $f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.5 \rfloor \cdot 0.1$  in MHz and  $F_{UL\_low}^{LB} + BW_{Channel}^{LB} / 2 \leq f_{UL}^{LB} \leq F_{UL\_high}^{LB} - BW_{Channel}^{LB} / 2$  with  $f_{DL}^{HB}$  carrier frequency in the victim (higher) band in MHz and  $BW_{Channel}^{LB}$  the channel bandwidth configured in the lower band.

NOTE 6: The requirements are only applicable to channel bandwidths no larger than 20 MHz and with a carrier frequency at  $\pm (20 + BW_{Channel}^{HB} / 2)$  MHz offset from  $2 f_{UL}^{LB}$  in the victim (higher band) with

$F_{UL\_low}^{LB} + BW_{Channel}^{LB} / 2 \leq f_{UL}^{LB} \leq F_{UL\_high}^{LB} - BW_{Channel}^{LB} / 2$ , where  $BW_{Channel}^{LB}$  and  $BW_{Channel}^{HB}$  are the channel bandwidths configured in the aggressor (lower) and victim (higher) bands in MHz, respectively.

NOTE 7: For these bandwidths, the minimum requirements are restricted to operation when carrier is configured as a downlink carrier part of CA configuration.

| UL band                                                                                                                                                                                                                                                                                                                                                                                                                                | DL band | UL BW | SCS of UL band | UL RB Allocation | DL BW | MSD  | UL/DL fc condition | UL/DL harmonic order |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------|----------------|------------------|-------|------|--------------------|----------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                        |         | (MHz) | (kHz)          | L <sub>CRB</sub> | (MHz) | (dB) |                    |                      |
| NOTE 8: For a UE which supports this band combination only when the Band n77 frequency range restriction defined in NOTE 12 of Table 5.2-1 applies, the MSD test point(s) cannot be verified for the band combination and the test point(s) can be skipped.                                                                                                                                                                            |         |       |                |                  |       |      |                    |                      |
| NOTE 9: Void.                                                                                                                                                                                                                                                                                                                                                                                                                          |         |       |                |                  |       |      |                    |                      |
| NOTE 10: These requirements apply when the lower edge frequency of the 10 MHz, 15 MHz, or 20 MHz uplink channel in Band 71 is located at or below 668 MHz and the downlink channel in Band n25 is located with its upper edge at 1995 MHz.                                                                                                                                                                                             |         |       |                |                  |       |      |                    |                      |
| NOTE 11: These requirements apply when the lower edge frequency of the uplink channel in Band n71 is located at or below 668 MHz and the downlink channel in Band n25 is located with its upper edge at 1990 MHz.                                                                                                                                                                                                                      |         |       |                |                  |       |      |                    |                      |
| NOTE 12: In the USA, n77 band is restricted to 3450 – 3550 MHz and 3700 – 3980 MHz. There is no UL harmonic due to n24 UL in downlink for n77 operating in 3450 – 3550 MHz and 3700 – 3980 MHz.                                                                                                                                                                                                                                        |         |       |                |                  |       |      |                    |                      |
| NOTE 13: No requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the low band for which the 2nd transmitter harmonic is within the downlink transmission bandwidth of the high band. The reference sensitivity for all active downlink component carriers is only verified when this is not the case (the requirements specified in clause 7.3.2 apply unless otherwise specified). |         |       |                |                  |       |      |                    |                      |

The reference sensitivity for the shared access band does not apply when there is at least one individual RE within the shared access downlink transmission bandwidth which falls into the reference sensitivity exclusion region as specified in Table 7.3A.4-1a.

**Table 7.3A.4-1a: NR-U reference sensitivity measurement exclusion region in MHz.**

| NR Band / Harmonic order / Channel BW in UL                                                                                  |                |         |        |        |        |        |        |        |        |         |
|------------------------------------------------------------------------------------------------------------------------------|----------------|---------|--------|--------|--------|--------|--------|--------|--------|---------|
| UL Band                                                                                                                      | Harmonic order | DL Band | 5MHz   | 10MHz  | 15MHz  | 20 MHz | 25 MHz | 30 MHz | 40MHz  | 50 MHz  |
| n7                                                                                                                           | 2              | n46     | +/- 10 | +/- 20 | +/- 30 | +/- 40 | +/- 50 | +/- 60 | +/- 80 | +/- 100 |
| n25                                                                                                                          | 3              | n46     | +/- 15 | +/- 23 | +/- 35 | +/- 45 | +/- 60 | +/- 70 | +/- 90 |         |
| n66                                                                                                                          | 3              | n46     | +/- 15 | +/- 23 | +/- 35 | +/- 45 | +/- 60 | +/- 70 | +/- 90 |         |
| n48                                                                                                                          | 2              | n96     | +/- 10 | +/- 20 | +/- 30 | +/- 40 |        | +/- 60 | +/- 80 |         |
| NOTE 1: Even though UL harmonic does not fall directly into NR-U band the exclusion region still applies.                    |                |         |        |        |        |        |        |        |        |         |
| NOTE 2: The center of the exclusion region is obtained by multiplying the UL channel center frequency by the harmonic order. |                |         |        |        |        |        |        |        |        |         |

**Table 7.3A.4-2: Void**

**Table 7.3A.4-3: Void**

**Table 7.3A.4-3a: Void**

Sensitivity degradation is allowed for different combinations of UL configurations and DL channel bandwidths if a band is impacted by receiver harmonic mixing due to another band part which belongs to PC3 NR band or PC2 NR band of the same CA configuration. Reference sensitivity exceptions and uplink/downlink configurations due to harmonic mixing from a PC3 aggressor NR UL band for either PC3 or PC2 CA are specified in Table 7.3A.4-4 and from a PC2 aggressor NR UL band for PC2 CA are specified in Table 7.3A.4-4a. For these exceptions, only the listed test points in Table 7.3A.4-4, Table 7.3A.4-4a and Table 7.3A.4-4b are needed to be tested. Sensitivity degradation is not required for receiver even order harmonic mixing with aggressor 3rd order and above harmonic interference.



**Table 7.3A.4-4: Reference sensitivity exceptions and uplink/downlink configurations due to harmonic mixing from a PC3 aggressor NR UL band for DL NR CA FR1**

| UL band          | DL band          | UL BW | SCS of UL band | UL RB Allocation | DL BW | MSD  | UL/DL fc condition | UL/DL harmonic order |
|------------------|------------------|-------|----------------|------------------|-------|------|--------------------|----------------------|
|                  |                  | (MHz) | (kHz)          | L <sub>CRB</sub> | (MHz) | (dB) |                    |                      |
| n25              | n71 <sup>3</sup> | 5     | 15             | 25 (RBstart=0)   | 5     | 26.5 | NOTE 4             | UL1/DL3              |
| n25              | n71 <sup>3</sup> | 20    | 15             | 100 (RBstart=0)  | 20    | 15.3 | NOTE 4             | UL1/DL3              |
| n40              | n20              | 5     | 15             | 25 (RBstart=0)   | 5     | 27.8 | NOTE 4             | UL1/DL3              |
| n40              | n20              | 20    | 15             | 100 (RBstart=0)  | 20    | 20.3 | NOTE 4             | UL1/DL3              |
| n40              | n28              | 5     | 15             | 25 (RBstart=0)   | 5     | 37.8 | NOTE 4             | UL1/DL3              |
| n40              | n28              | 20    | 15             | 100 (RBstart=0)  | 20    | 30.3 | NOTE 4             | UL1/DL3              |
| n41              | n18 <sup>3</sup> | 10    | 15             | 25 (RBstart=0)   | 5     | 24.3 | NOTE 4             | UL1/DL3              |
| n41              | n18 <sup>3</sup> | 15    | 15             | 75 (RBstart=0)   | 15    | 22.5 | NOTE 4             | UL1/DL3              |
| n41              | n48              | 10    | 30             | 24 (RBstart=0)   | 10    | 8.3  | NOTE 9             | UL4/DL3              |
| n41              | n48              | 10    | 30             | 24 (RBstart=0)   | 100   | 0.4  | NOTE 9             | UL4/DL3              |
| n46              | n7               | 5     | 15             | 12 (RBstart=0)   | 5     | 8.3  | NOTE 7             | UL1/DL2              |
| n46              | n7               | 5     | 15             | 24 (RBstart=0)   | 50    | 0.6  | NOTE 7             | UL1/DL2              |
| n46              | n48              | 5     | 15             | 12 (RBstart=0)   | 5     | 22.6 | NOTE 2             | UL2/DL3              |
| n46              | n48              | 20    | 15             | 100 (RBstart=0)  | 100   | 12   | NOTE 2             | UL2/DL3              |
| n46              | n78              | 5     | 15             | 25 (RBstart=0)   | 10    | 19.5 | NOTE 2             | UL2/DL3              |
| n46              | n78              | 20    | 15             | 100 (RBstart=0)  | 100   | 12   | NOTE 2             | UL2/DL3              |
| n77              | n2               | 10    | 15             | 25 (RBstart=0)   | 5     | 6.7  | NOTE 7             | UL1/DL2              |
| n77              | n2               | 20    | 15             | 100 (RBstart=0)  | 20    | 3,7  | NOTE 7             | UL1/DL2              |
| n77              | n5               | 10    | 15             | 25 (RBstart=0)   | 5     | 5.7  | NOTE 8             | UL1/DL4              |
| n77              | n5               | 20    | 15             | 100 (RBstart=0)  | 20    | 2.7  | NOTE 8             | UL1/DL4              |
| n77              | n8               | 10    | 15             | 100 (RBstart=0)  | 20    | 5.7  | NOTE 8             | UL1/DL4              |
| n77              | n8               | 20    | 15             | 100 (RBstart=0)  | 20    | 2.7  | NOTE 8             | UL1/DL4              |
| n77              | n12              | 10    | 15             | 25 (RBstart=0)   | 5     | 31   | NOTE 5             | UL1/DL5              |
| n77              | n12              | 15    | 15             | 75 (RBstart=0)   | 15    | 26.2 | NOTE 5             | UL1/DL5              |
| n77              | n13              | 10    | 15             | 25 (RBstart=0)   | 5     | 31   | NOTE 5             | UL1/DL5              |
| n77              | n13              | 10    | 15             | 50 (RBstart=0)   | 10    | 28   | NOTE 5             | UL1/DL5              |
| n77              | n14              | 10    | 15             | 25 (RBstart=0)   | 5     | 31   | NOTE 5             | UL1/DL5              |
| n77              | n14              | 10    | 15             | 50 (RBstart=0)   | 10    | 28   | NOTE 5             | UL1/DL5              |
| n77              | n25              | 10    | 15             | 25 (RBstart=0)   | 5     | 6.7  | NOTE 7             | UL1/DL2              |
| n77              | n25              | 20    | 15             | 100 (RBstart=0)  | 40    | 1.1  | NOTE 7             | UL1/DL2              |
| n77 <sup>6</sup> | n29              | 10    | 15             | 25 (RBstart=0)   | 5     | 31   | NOTE 5             | UL1/DL5              |
| n77 <sup>6</sup> | n29              | 10    | 15             | 50 (RBstart=0)   | 10    | 28   | NOTE 5             | UL1/DL5              |
| n77              | n30              | 10    | 15             | 12 (RBstart=0)   | 5     | 10.4 | NOTE 2             | UL2/DL3              |
| n77              | n30              | 10    | 15             | 24 (RBstart=0)   | 10    | 8.0  | NOTE 2             | UL2/DL3              |
| n77              | n40              | 20    | 30             | 50 (RBstart=0)   | 10    | 10.4 | NOTE 2             | UL2/DL3              |
| n77              | n40              | 20    | 30             | 50 (RBstart=0)   | 100   | 0.9  | NOTE 2             | UL2/DL3              |
| n77              | n41              | 20    | 30             | 50 (RBstart=0)   | 10    | 10.4 | NOTE 2             | UL2/DL3              |
| n77              | n41              | 20    | 30             | 50 (RBstart=0)   | 100   | 6.3  | NOTE 2             | UL2/DL3              |
| n78              | n5               | 510   | 15             | 25 (RBstart=0)   | 5     | 5.7  | NOTE 8             | UL1/DL4              |

| UL band                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | DL band | UL BW | SCS of UL band | UL RB Allocation | DL BW | MSD  | UL/DL fc condition | UL/DL harmonic order |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------|----------------|------------------|-------|------|--------------------|----------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |         | (MHz) | (kHz)          | L <sub>CRB</sub> | (MHz) | (dB) |                    |                      |
| n78                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | n8      | 510   | 15             | 25 (RBstart=0)   | 5     | 5.7  | NOTE 8             | UL1/DL4              |
| n78                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | n28     | 10    | 15             | 25 (RBstart=0)   | 5     | 31   | NOTE 5             | UL1/DL5              |
| n78                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | n40     | 20    | 30             | 50 (RBstart=0)   | 5     | 10.4 | NOTE 2             | UL2/DL3              |
| n78                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | n40     | 20    | 30             | 50 (RBstart=0)   | 80    | 4.5  | NOTE 2             | UL2/DL3              |
| n78                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | n41     | 20    | 30             | 50 (RBstart=0)   | 10    | 10.4 | NOTE 2             | UL2/DL3              |
| n78                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | n41     | 20    | 30             | 50 (RBstart=0)   | 100   | 6.3  | NOTE 2             | UL2/DL3              |
| n79                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | n8      | 10    | 15             | 25 (RBstart=0)   | 5     | 25   | NOTE 5             | UL1/DL5              |
| n96                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | n48     | 5     | 15             | 25 (RBstart=0)   | 5     | 5.8  | NOTE 2             | UL2/DL3              |
| n96                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | n48     | 20    | 15             | 100 (RBstart=0)  | 100   | 0.5  | NOTE 2             | UL2/DL3              |
| <p>NOTE 1: Void.</p> <p>NOTE 2: The requirements should be verified for DL NR-ARFCN of the Victim (lower) band (superscript LB) such that <math>f_{DL}^{LB} = \lfloor f_{UL}^{HB} / 0.15 \rfloor 0.1</math> and <math>F_{UL\_low}^{HB} + BW_{Channel}^{HB} / 2 \leq f_{UL}^{HB} \leq F_{UL\_high}^{HB} - BW_{Channel}^{HB} / 2</math> with <math>f_{UL}^{HB}</math> the UL carrier frequency and <math>BW_{Channel}^{HB}</math> the channel bandwidth configured in the higher band, both in MHz.</p> <p>NOTE 3: These requirements apply when there is at least one individual RE within the downlink transmission bandwidth of the victim (lower) band for which the 3<sup>rd</sup> harmonic is within the uplink transmission bandwidth or the uplink adjacent channel's transmission bandwidth of an aggressor (higher) band.</p> <p>NOTE 4: The requirements should be verified for UL NR-ARFCN of the aggressor (higher) band (superscript HB) such that <math>f_{DL}^{LB} = \lfloor f_{UL}^{HB} / 0.3 \rfloor 0.1</math> in MHz and <math>F_{UL\_low}^{HB} + BW_{Channel}^{HB} / 2 \leq f_{UL}^{HB} \leq F_{UL\_high}^{HB} - BW_{Channel}^{HB} / 2</math> with <math>f_{DL}^{LB}</math> the carrier frequency in the victim (lower) band and <math>BW_{Channel}^{HB}</math> the channel bandwidth configured in the higher band.</p> <p>NOTE 5: The requirements should be verified for DL EARFCN of the victim (lower) band (superscript LB) such that <math>f_{DL}^{LB} = \lfloor f_{UL}^{HB} / 0.5 \rfloor 0.1</math> and <math>F_{UL\_low}^{HB} + BW_{Channel}^{HB} / 2 \leq f_{UL}^{HB} \leq F_{UL\_high}^{HB} - BW_{Channel}^{HB} / 2</math> with <math>f_{UL}^{HB}</math> the UL carrier frequency and <math>BW_{Channel}^{HB}</math> the channel bandwidth configured in the higher band, both in MHz.</p> <p>NOTE 6: For a UE which supports this band combination only when the Band n77 frequency range restriction defined in NOTE 12 of Table 5.2-1 applies, the MSD test point(s) cannot be verified for the band combination and the test point(s) can be skipped.</p> <p>NOTE 7: The requirements should be verified for UL NR-ARFCN of the aggressor (higher) band (superscript HB) such that <math>f_{DL}^{LB} = \lfloor f_{UL}^{HB} / 0.2 \rfloor 0.1</math> in MHz and <math>F_{UL\_low}^{HB} + BW_{Channel}^{HB} / 2 \leq f_{UL}^{HB} \leq F_{UL\_high}^{HB} - BW_{Channel}^{HB} / 2</math> with <math>f_{DL}^{LB}</math> the carrier frequency in the victim (lower) band and <math>BW_{Channel}^{HB}</math> the channel bandwidth configured in the higher band.</p> <p>NOTE 8: The requirements should be verified for UL NR-ARFCN of the aggressor (higher) band (superscript HB) such that <math>f_{DL}^{LB} = \lfloor f_{UL}^{HB} / 0.4 \rfloor 0.1</math> in MHz and <math>F_{UL\_low}^{HB} + BW_{Channel}^{HB} / 2 \leq f_{UL}^{HB} \leq F_{UL\_high}^{HB} - BW_{Channel}^{HB} / 2</math> with <math>f_{DL}^{LB}</math> the carrier frequency in the victim (lower) band and <math>BW_{Channel}^{HB}</math> the channel bandwidth configured in the higher band.</p> <p>NOTE 9: The requirements should be verified for DL NR-ARFCN of the victim (higher) band (superscript HB) such that <math>f_{DL}^{HB} = \lfloor f_{UL}^{LB} / 0.75 \rfloor</math> and <math>F_{UL\_low}^{LB} + BW_{Channel}^{LB} / 2 \leq f_{UL}^{LB} \leq F_{UL\_high}^{LB} - BW_{Channel}^{LB} / 2</math> with <math>f_{UL}^{LB}</math> the UL carrier frequency and <math>BW_{Channel}^{LB}</math> the channel bandwidth configured in the lower band, both in MHz.</p> |         |       |                |                  |       |      |                    |                      |

**Table 7.3A.4-4a: Reference sensitivity exceptions and uplink/downlink configurations due to harmonic mixing from a PC2 aggressor NR UL band for NR DL CA FR1**

| UL band          | DL band | UL BW | SCS of UL band | UL RB Allocation | DL BW | MSD  | UL/DL fc condition | UL/DL harmonic order |
|------------------|---------|-------|----------------|------------------|-------|------|--------------------|----------------------|
|                  |         | (MHz) | (kHz)          | L <sub>CRB</sub> | (MHz) | (dB) |                    |                      |
| n77              | n2      | 10    | 15             | 25 (RBstart=0)   | 5     | 9.1  | NOTE 4             | UL1/DL2              |
| n77              | n2      | 20    | 15             | 100 (RBstart=0)  | 20    | 6.7  | NOTE 4             | UL1/DL2              |
| n77              | n5      | 10    | 15             | 25 (RBstart=0)   | 5     | 8.1  | NOTE 5             | UL1/DL4              |
| n77              | n5      | 20    | 15             | 20 (RBstart=0)   | 20    | 4.3  | NOTE 5             | UL1/DL4              |
| n77              | n12     | 10    | 15             | 25 (RBstart=0)   | 5     | 34   | NOTE 1             | UL1/DL5              |
| n77              | n12     | 15    | 15             | 75 (RBstart=0)   | 15    | 29.2 | NOTE 1             | UL1/DL5              |
| n77              | n13     | 10    | 15             | 25 (RBstart=0)   | 5     | 34   | NOTE 1             | UL1/DL5              |
| n77              | n13     | 10    | 15             | 50 (RBstart=0)   | 10    | 31   | NOTE 1             | UL1/DL5              |
| n77              | n14     | 10    | 15             | 25 (RBstart=0)   | 5     | 34   | NOTE 1             | UL1/DL5              |
| n77              | n14     | 10    | 15             | 50 (RBstart=0)   | 10    | 31   | NOTE 1             | UL1/DL5              |
| n77              | n25     | 10    | 15             | 25 (RBstart=0)   | 5     | 9.2  | NOTE 4             | UL1/DL2              |
| n77              | n25     | 20    | 15             | 100 (RBstart=0)  | 40    | 2.0  | NOTE 4             | UL1/DL2              |
| n77 <sup>2</sup> | n29     | 10    | 15             | 25 (RBstart=0)   | 5     | 34   | NOTE 1             | UL1/DL5              |
| n77 <sup>2</sup> | n29     | 10    | 15             | 50 (RBstart=0)   | 10    | 31   | NOTE 1             | UL1/DL5              |
| n77              | n30     | 10    | 15             | 12 (RBstart=0)   | 5     | 13.2 | NOTE 3             | UL2/DL3              |
| n77              | n30     | 10    | 15             | 25 (RBstart=0)   | 10    | 10.6 | NOTE 3             | UL2/DL3              |
| n77              | n41     | 20    | 30             | 50 (RBstart=0)   | 10    | 13.2 | NOTE 3             | UL2/DL3              |
| n77              | n41     | 20    | 30             | 50 (RBstart=0)   | 100   | 8.8  | NOTE 3             | UL2/DL3              |
| n78              | n3      | 10    | 15             | 25 (RBstart=0)   | 5     | 8.1  | NOTE 4             | UL1/DL2              |
| n78              | n3      | 40    | 15             | 216 (RBstart=0)  | 40    | 1    | NOTE 4             | UL1/DL2              |
| n78              | n5      | 10    | 15             | 25 (RBstart=0)   | 5     | 8.1  | NOTE 5             | UL1/DL4              |
| n78              | n8      | 10    | 15             | 25 (RBstart=0)   | 5     | 8.1  | NOTE 5             | UL1/DL4              |
| n78              | n28     | 10    | 15             | 25 (RBstart=0)   | 5     | 31   | NOTE 1             | UL1/DL5              |
| n78              | n28     | 30    | 15             | 160 (RBstart=0)  | 30    | 11.7 | NOTE 1             | UL1/DL5              |

NOTE 1: The requirements should be verified for DL NR-ARFCN of the victim (lower) band (superscript LB) such that  $f_{DL}^{LB} = \lfloor f_{UL}^{HB} / 0.5 \rfloor 0.1$  and  $F_{UL,low}^{HB} + BW_{Channel}^{HB} / 2 \leq f_{UL}^{HB} \leq F_{UL,high}^{HB} - BW_{Channel}^{HB} / 2$  with  $f_{UL}^{HB}$  the UL carrier frequency and  $BW_{Channel}^{HB}$  the channel bandwidth configured in the higher band, both in MHz.

NOTE 2: For a UE which supports this band combination only when the Band n77 frequency range restriction defined in NOTE 12 of Table 5.2-1 from TS 38.101-1 applies, the MSD test point(s) cannot be verified for the band combination and the test point(s) can be skipped.

NOTE 3: The requirements should be verified for DL NR-ARFCN of the Victim (lower) band (superscript LB) such that  $f_{DL}^{LB} = \lfloor f_{UL}^{HB} / 0.15 \rfloor 0.1$  and  $F_{UL,low}^{HB} + BW_{Channel}^{HB} / 2 \leq f_{UL}^{HB} \leq F_{UL,high}^{HB} - BW_{Channel}^{HB} / 2$  with  $f_{UL}^{HB}$  the UL carrier frequency and  $BW_{Channel}^{HB}$  the channel bandwidth configured in the higher band, both in MHz.

NOTE 4: The requirements should be verified for UL NR-ARFCN of the aggressor (higher) band (superscript HB) such that  $f_{DL}^{LB} = \lfloor f_{UL}^{HB} / 0.2 \rfloor 0.1$  in MHz and  $F_{UL,low}^{HB} + BW_{Channel}^{HB} / 2 \leq f_{UL}^{HB} \leq F_{UL,high}^{HB} - BW_{Channel}^{HB} / 2$  with  $f_{DL}^{LB}$  the carrier frequency in the victim (lower) band and  $BW_{Channel}^{HB}$  the channel bandwidth configured in the higher band.

NOTE 5: The requirements should be verified for UL NR-ARFCN of the aggressor (higher) band (superscript HB) such that  $f_{DL}^{LB} = \lfloor f_{UL}^{HB} / 0.4 \rfloor 0.1$  in MHz and  $F_{UL,low}^{HB} + BW_{Channel}^{HB} / 2 \leq f_{UL}^{HB} \leq F_{UL,high}^{HB} - BW_{Channel}^{HB} / 2$  with

| UL band                                                                                                                                     | DL band | UL BW | SCS of UL band | UL RB Allocation | DL BW | MSD  | UL/DL fc condition | UL/DL harmonic order |
|---------------------------------------------------------------------------------------------------------------------------------------------|---------|-------|----------------|------------------|-------|------|--------------------|----------------------|
|                                                                                                                                             |         | (MHz) | (kHz)          | L <sub>CRB</sub> | (MHz) | (dB) |                    |                      |
| $f_{DL}^{LB}$ the carrier frequency in the victim (lower) band and $BW_{Channel}^{HB}$ the channel bandwidth configured in the higher band. |         |       |                |                  |       |      |                    |                      |

**Table 7.3A.4-4b: Reference sensitivity exceptions and uplink/downlink configurations due to harmonic mixing from a PC1.5 NR UL band for NR DL CA FR1**

| UL band | DL band | UL BW | SCS of UL band | UL RB Allocation | DL BW | MSD  | UL/DL fc condition | UL/DL harmonic order |
|---------|---------|-------|----------------|------------------|-------|------|--------------------|----------------------|
|         |         | (MHz) | (kHz)          | L <sub>CRB</sub> | (MHz) | (dB) |                    |                      |
| n77     | n2      | 10    | 15             | 25 (RBstart=0)   | 5     | 11.8 | NOTE 4             | UL1/DL2              |
| n77     | n2      | 20    | 15             | 100 (RBstart=0)  | 20    | 9.2  | NOTE 4             | UL1/DL2              |
| n77     | n5      | 10    | 15             | 25 (RBstart=0)   | 5     | 10.7 | NOTE 5             | UL1/DL4              |
| n77     | n5      | 20    | 15             | 20 (RBstart=0)   | 20    | 6.4  | NOTE 5             | UL1/DL4              |
| n77     | n12     | 10    | 15             | 25 (RBstart=0)   | 5     | 37   | NOTE 1             | UL1/DL5              |
| n77     | n12     | 15    | 15             | 75 (RBstart=0)   | 15    | 32.2 | NOTE 1             | UL1/DL5              |
| n77     | n13     | 10    | 15             | 25 (RBstart=0)   | 5     | 37   | NOTE 1             | UL1/DL5              |
| n77     | n13     | 10    | 15             | 50 (RBstart=0)   | 10    | 34   | NOTE 1             | UL1/DL5              |
| n77     | n14     | 10    | 15             | 25 (RBstart=0)   | 5     | 37   | NOTE 1             | UL1/DL5              |
| n77     | n14     | 10    | 15             | 50 (RBstart=0)   | 10    | 34   | NOTE 1             | UL1/DL5              |
| n77     | n25     | 10    | 15             | 25 (RBstart=0)   | 5     | 11.9 | NOTE 4             | UL1/DL2              |
| n77     | n25     | 20    | 15             | 100 (RBstart=0)  | 40    | 3.3  | NOTE 4             | UL1/DL2              |
| n77     | n29     | 10    | 15             | 25 (RBstart=0)   | 5     | 37   | NOTE 1             | UL1/DL5              |
| n77     | n29     | 10    | 15             | 50 (RBstart=0)   | 10    | 34   | NOTE 1             | UL1/DL5              |
| n77     | n30     | 10    | 15             | 12 (RBstart=0)   | 5     | 16.1 | NOTE 3             | UL2/DL3              |
| n77     | n30     | 10    | 15             | 25 (RBstart=0)   | 10    | 13.5 | NOTE 3             | UL2/DL3              |
| n77     | n41     | 20    | 30             | 50 (RBstart=0)   | 10    | 16.1 | NOTE 3             | UL2/DL3              |
| n77     | n41     | 20    | 30             | 50 (RBstart=0)   | 100   | 11.5 | NOTE 3             | UL2/DL3              |

- NOTE 1: The requirements should be verified for DL NR-ARFCN of the victim (lower) band (superscript LB) such that  $f_{DL}^{LB} = \lfloor f_{UL}^{HB} / 0.5 \rfloor 0.1$  and  $F_{UL,low}^{HB} + BW_{Channel}^{HB} / 2 \leq f_{UL}^{HB} \leq F_{UL,high}^{HB} - BW_{Channel}^{HB} / 2$  with  $f_{UL}^{HB}$  the UL carrier frequency and  $BW_{Channel}^{HB}$  the channel bandwidth configured in the higher band, both in MHz.
- NOTE 2: For a UE which supports this band combination only when the Band n77 frequency range restriction defined in NOTE 12 of Table 5.2-1 from TS 38.101-1 applies, the MSD test point(s) cannot be verified for the band combination and the test point(s) can be skipped.
- NOTE 3: The requirements should be verified for DL NR-ARFCN of the Victim (lower) band (superscript LB) such that  $f_{DL}^{LB} = \lfloor f_{UL}^{HB} / 0.15 \rfloor 0.1$  and  $F_{UL,low}^{HB} + BW_{Channel}^{HB} / 2 \leq f_{UL}^{HB} \leq F_{UL,high}^{HB} - BW_{Channel}^{HB} / 2$  with  $f_{UL}^{HB}$  the UL carrier frequency and  $BW_{Channel}^{HB}$  the channel bandwidth configured in the higher band, both in MHz.
- NOTE 4: The requirements should be verified for UL NR-ARFCN of the aggressor (higher) band (superscript HB) such that  $f_{DL}^{LB} = \lfloor f_{UL}^{HB} / 0.2 \rfloor 0.1$  in MHz and  $F_{UL,low}^{HB} + BW_{Channel}^{HB} / 2 \leq f_{UL}^{HB} \leq F_{UL,high}^{HB} - BW_{Channel}^{HB} / 2$  with  $f_{DL}^{LB}$  the carrier frequency in the victim (lower) band and  $BW_{Channel}^{HB}$  the channel bandwidth configured in the higher band.
- NOTE 5: The requirements should be verified for UL NR-ARFCN of the aggressor (higher) band (superscript HB) such that  $f_{DL}^{LB} = \lfloor f_{UL}^{HB} / 0.4 \rfloor 0.1$  in MHz and  $F_{UL,low}^{HB} + BW_{Channel}^{HB} / 2 \leq f_{UL}^{HB} \leq F_{UL,high}^{HB} - BW_{Channel}^{HB} / 2$

| UL band                                                                                                                                          | DL band | UL BW | SCS of UL band | UL RB Allocation | DL BW | MSD  | UL/DL fc condition | UL/DL harmonic order |
|--------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------|----------------|------------------|-------|------|--------------------|----------------------|
|                                                                                                                                                  |         | (MHz) | (kHz)          | L <sub>CRB</sub> | (MHz) | (dB) |                    |                      |
| n77                                                                                                                                              | n2      | 10    | 15             | 25 (RBstart=0)   | 5     | 11.8 | NOTE 4             | UL1/DL2              |
| n77                                                                                                                                              | n2      | 20    | 15             | 100 (RBstart=0)  | 20    | 9.2  | NOTE 4             | UL1/DL2              |
| with $f_{DL}^{LB}$ the carrier frequency in the victim (lower) band and $BW_{Channel}^{HB}$ the channel bandwidth configured in the higher band. |         |       |                |                  |       |      |                    |                      |

Table 7.3A.4-4c: Void

Table 7.3A.4-4d: Reference sensitivity exceptions and uplink/downlink configurations due to harmonic mixing from a power class 5 aggressor NR UL band for NR DL CA FR1

| UL band                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | DL band | UL BW | SCS of UL band | UL RB Allocation | DL BW | MSD  | UL/DL fc condition | UL/DL harmonic order |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------|----------------|------------------|-------|------|--------------------|----------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |         | (MHz) | (kHz)          | L <sub>CRB</sub> | (MHz) | (dB) |                    |                      |
| n46                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | n7      | 5     | 15             | 12 (RBstart=0)   | 5     | 5.3  | NOTE 7             | UL1/DL2              |
| n46                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | n7      | 5     | 15             | 24 (RBstart=0)   | 30    | 0.8  | NOTE 7             | UL1/DL2              |
| n46                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | n48     | 5     | 15             | 12 (RBstart=0)   | 5     | 20.3 | NOTE 2             | UL2/DL3              |
| n46                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | n48     | 20    | 15             | 100 (RBstart=0)  | 100   | 9.7  | NOTE 2             | UL2/DL3              |
| n46                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | n78     | 5     | 15             | 25 (RBstart=0)   | 10    | 17.2 | NOTE 2             | UL2/DL3              |
| n46                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | n78     | 20    | 15             | 100 (RBstart=0)  | 100   | 9.7  | NOTE 2             | UL2/DL3              |
| n96                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | n48     | 5     | 15             | 25 (RBstart=0)   | 5     | 3.5  | NOTE 2             | UL2/DL3              |
| n96                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | n48     | 20    | 15             | 100 (RBstart=0)  | 15    | 0.4  | NOTE 2             | UL2/DL3              |
| <p>NOTE 1: Void.</p> <p>NOTE 2: The requirements should be verified for UL NR-ARFCN of the aggressor (high) band (superscript HB) such that <math>f_{UL}^{LB} = \lfloor 15 * f_{DL}^{HB} \rfloor 0.1</math> in MHz and <math>F_{UL,low}^{LB} + BW_{Channel}^{LB}/2 \leq f_{UL}^{LB} \leq F_{UL,high}^{LB} - BW_{Channel}^{LB}/2</math> with <math>f_{DL}^{LB}</math> carrier frequency in the victim (lower) band in MHz and <math>BW_{Channel}^{LB}</math> the channel bandwidth configured in the higher band.</p> <p>NOTE 3: These requirements apply when there is at least one individual RE within the downlink transmission bandwidth of the victim (lower) band for which the 3<sup>rd</sup> harmonic is within the uplink transmission bandwidth or the uplink adjacent channel's transmission bandwidth of an aggressor (higher) band.</p> <p>NOTE 4: Void.</p> <p>NOTE 5: The requirements should be verified for DL NR-ARFCN of the victim (lower) band (superscript LB) such that <math>f_{DL}^{LB} = \lfloor f_{UL}^{HB} / 0.5 \rfloor 0.1</math> with <math>f_{DL}^{LB}</math> the DL carrier frequency in the lower band and <math>f_{UL}^{HB}</math> the UL carrier frequency in the higher band, both in MHz.</p> <p>NOTE 6: Void.</p> <p>NOTE 7: The requirements should be verified for UL NR-ARFCN of the aggressor (higher) band (superscript HB) such that <math>f_{DL}^{LB} = \lfloor f_{UL}^{HB} / 0.2 \rfloor 0.1</math> in MHz and <math>F_{UL,low}^{HB} + BW_{Channel}^{HB}/2 \leq f_{UL}^{HB} \leq F_{UL,high}^{HB} - BW_{Channel}^{HB}/2</math> with <math>f_{DL}^{LB}</math> the carrier frequency in the victim (lower) band and <math>BW_{Channel}^{HB}</math> the channel bandwidth configured in the higher band.</p> |         |       |                |                  |       |      |                    |                      |

Table 7.3A.4-5: Void

## 7.3A.5 Reference sensitivity exceptions due to intermodulation interference due to 2UL CA

For inter-band carrier aggregation with uplink assigned to up to two NR bands given in Table 7.3A.5-1, Table 7.3A.5-1a, Table 7.3A.5-2 and Table 7.3A.5-2a the reference sensitivity is defined only for the specific uplink and downlink test points specified in Table 7.3A.5-1, Table 7.3A.5-1a, Table 7.3A.5-2 and Table 7.3A.5-2a. For these test points the reference sensitivity requirement specified in Table 7.3.2-1a, Table 7.3.2-1b and Table 7.3.2-2 are relaxed by the amount of the corresponding parameter MSD given in Table 7.3A.5-1, Table 7.3A.5-1a, Table 7.3A.5-2 and Table 7.3A.5-2a.

**Table 7.3A.5-1: 2DL/2UL inter-band Reference sensitivity QPSK  $P_{\text{REFSENS}}$  and uplink/downlink configurations for PC3 CA**

| Band / Channel bandwidth / $N_{\text{RB}}$ / Duplex mode |                   |                |                |                                                           |                |          |             | Source of IMD      |
|----------------------------------------------------------|-------------------|----------------|----------------|-----------------------------------------------------------|----------------|----------|-------------|--------------------|
| NR CA band combination                                   | NR band           | UL $F_c$ (MHz) | UL/DL BW (MHz) | UL $L_{\text{CRB}}$                                       | DL $F_c$ (MHz) | MSD (dB) | Duplex mode |                    |
| CA_n1-n3                                                 | n1                | 1950           | 5              | 25                                                        | 2140           | 23       | FDD         | IMD3               |
|                                                          | n3                | 1760           | 5              | 25                                                        | 1855           | N/A      | TDD         | N/A                |
| CA_n1-n8                                                 | n1                | 1965           | 5              | 25                                                        | 2155           | 6.0      | FDD         | IMD4               |
|                                                          | n8                | 887.5          | 5              | 25                                                        | 932.5          | N/A      | FDD         | N/A                |
| CA_n1-n77                                                | 1                 | 1950           | 5              | 25                                                        | 2140           | 29.8     | FDD         | IMD2 <sup>4</sup>  |
|                                                          | n77               | 4090           | 10             | 50                                                        | 4090           | N/A      | TDD         | N/A                |
|                                                          | 1                 | 1950           | 5              | 25                                                        | 2140           | 8.0      | FDD         | IMD4 <sup>4</sup>  |
|                                                          | n77               | 3710           | 10             | 50                                                        | 3710           | N/A      | TDD         | N/A                |
| CA_n1-n78                                                | n1                | 1950           | 5              | 25                                                        | 2140           | 8.0      | FDD         | IMD4               |
|                                                          | n78               | 3710           | 10             | 50                                                        | 3710           | N/A      | TDD         | N/A                |
|                                                          | n1                | N/A            | 5              | N/A                                                       | 2167.5         | 1.7      | FDD         | IMD7 <sup>15</sup> |
|                                                          | n78 <sup>12</sup> | 3305<br>3675   | 10<br>10       | 1 (RB <sub>START</sub> =0)<br>1 (RB <sub>START</sub> =44) | 3305<br>3675   | N/A      | TDD         | N/A                |
| CA_n2-n48                                                | n2                | 1852.5         | 5              | 25                                                        | 1932.5         | 12       | FDD         | IMD4               |
|                                                          | n48               | 3625           | 20             | 100                                                       | 3625           | N/A      | TDD         | N/A                |
| CA_n2-n66                                                | n2                | 1855           | 5              | 25                                                        | 1935           | 20       | FDD         | IMD3               |
|                                                          | n66               | 1775           | 5              | 25                                                        | 2175           | N/A      | FDD         | N/A                |
|                                                          | n2                | 1883.3         | 5              | 25                                                        | 1963.3         | N/A      | FDD         | N/A                |
|                                                          | n66               | 1750           | 5              | 25                                                        | 2150           | 4        | FDD         | IMD5               |
| CA_n2-n77                                                | n2                | 1855           | 5              | 25                                                        | 1935           | 26       | FDD         | IMD2               |
|                                                          | n77               | 3790           | 10             | 50                                                        | 3790           | N/A      | TDD         | N/A                |
|                                                          | n2                | 1900           | 5              | 25                                                        | 1980           | 8.0      | FDD         | IMD4               |
|                                                          | n77               | 3720           | 10             | 50                                                        | 3720           | N/A      | TDD         | N/A                |
|                                                          | n2                | 1885           | 5              | 25                                                        | 1965           | 5        | FDD         | IMD5               |
|                                                          | n77               | 3810           | 10             | 50                                                        | 3810           | N/A      | TDD         | N/A                |
|                                                          | n2                | N/A            | 5              | N/A                                                       | 1987.5         | 2.7      | FDD         | IMD7               |
|                                                          | n77 <sup>12</sup> | 3455<br>3945   | 10<br>10       | 1 (RB <sub>START</sub> =10)<br>1 (RB <sub>START</sub> =0) | 3455<br>3945   | N/A      | TDD         | N/A                |
| CA_n2-n78                                                | n2                | 1855           | 5              | 25                                                        | 1935           | 26       | FDD         | IMD2 <sup>4</sup>  |
|                                                          | n78               | 3790           | 10             | 50                                                        | 3790           | N/A      | TDD         | N/A                |
| CA_n3-n5                                                 | n3                | 1771           | 10             | 50                                                        | 1866           | 4        | FDD         | IMD4               |
|                                                          | n5                | 838            | 5              | 25                                                        | 883            | N/A      | FDD         | N/A                |
|                                                          | n3                | 1721           | 10             | 50                                                        | 1816           | N/A      | FDD         | N/A                |
|                                                          | n5                | 838            | 5              | 25                                                        | 883            | 24       | FDD         | IMD2 <sup>3</sup>  |
| CA_n3-n7                                                 | n3                | 1730           | 5              | 25                                                        | 1825           | N/A      | FDD         | N/A                |
|                                                          | n7                | 2535           | 10             | 50                                                        | 2655           | 10.2     | FDD         | IMD4               |
| CA_n3-n8                                                 | n3                | 1755           | 10             | 50                                                        | 1850           | N/A      | FDD         | N/A                |
|                                                          | n8                | 900            | 5              | 25                                                        | 945            | 8        | FDD         | IMD4 <sup>4</sup>  |

| Band / Channel bandwidth / N <sub>RB</sub> / Duplex mode |                   |                            |                      |                                                           |                            |                  |                | Source of<br>IMD   |
|----------------------------------------------------------|-------------------|----------------------------|----------------------|-----------------------------------------------------------|----------------------------|------------------|----------------|--------------------|
| NR CA band<br>combination                                | NR band           | UL F <sub>c</sub><br>(MHz) | UL/DL<br>BW<br>(MHz) | UL<br>L <sub>CRB</sub>                                    | DL F <sub>c</sub><br>(MHz) | MSD<br>(dB)      | Duplex<br>mode |                    |
|                                                          | n3                | 1747.5                     | 10                   | 50                                                        | 1842.5                     | 6.4              | FDD            | IMD5               |
|                                                          | n8                | 897.5                      | 5                    | 25                                                        | 942.5                      | N/A              | FDD            | N/A                |
| CA_n3-n18                                                | n18               | 818                        | 5                    | 25                                                        | 863                        | N/A              | FDD            | N/A                |
|                                                          | n3                | 1731                       | 5                    | 25                                                        | 1826                       | 4                | FDD            | IMD4               |
| CA_n3-n20                                                | 3                 | 1775                       | 5                    | 25                                                        | 1870                       | 4                | FDD            | IMD4               |
|                                                          | 20                | 840                        | 5                    | 25                                                        | 799                        | N/A              | FDD            | N/A                |
|                                                          | 3                 | 1735                       | 5                    | 25                                                        | 1830                       | N/A              | FDD            | N/A                |
|                                                          | 20                | 847                        | 5                    | 25                                                        | 806                        | 9                | FDD            | IMD4               |
| CA_n3-n38                                                | n3                | 1713                       | 5                    | 25                                                        | 1808                       | 8.2              | FDD            | IMD4               |
|                                                          | n38               | 2617                       | 5                    | 25                                                        | 2617                       | N/A              | TDD            | N/A                |
| CA_n3-n41                                                | n3                | 1740                       | 5                    | 25                                                        | 1835                       | 8.2              | FDD            | IMD4               |
|                                                          | n41               | 2657.5                     | 10                   | 50                                                        | 2657.5                     | N/A              | TDD            | N/A                |
| CA_n3-n77                                                | n3                | 1740                       | 5                    | 25                                                        | 1835                       | 26               | FDD            | IMD2 <sup>4</sup>  |
|                                                          | n77               | 3575                       | 10                   | 50                                                        | 3575                       | N/A              | TDD            | N/A                |
|                                                          | n3                | 1765                       | 5                    | 25                                                        | 1860                       | 8.0              | FDD            | IMD4 <sup>4</sup>  |
|                                                          | n77               | 3435                       | 10                   | 50                                                        | 3435                       | N/A              | TDD            | N/A                |
|                                                          | n3                | N/A                        | N/A                  | N/A                                                       | N/A                        | N/A <sup>6</sup> | FDD            | IMD5               |
|                                                          | n77               | N/A                        | N/A                  | N/A                                                       | N/A                        | N/A              | TDD            | N/A                |
|                                                          | n3                | N/A                        | 5                    | N/A                                                       | 1877.5                     | 2.2              | FDD            | IMD7               |
|                                                          | n77               | 3427.5<br>3945             | 10<br>10             | 1 (RB <sub>START</sub> =10)<br>1 (RB <sub>START</sub> =0) | 3427.5<br>3945             | N/A              | TDD            | N/A                |
| CA_n3-n78                                                | n3                | 1740                       | 5                    | 25                                                        | 1835                       | 26               | FDD            | IMD2 <sup>4</sup>  |
|                                                          | n78               | 3575                       | 10                   | 25                                                        | 3575                       | N/A              | TDD            | N/A                |
|                                                          | n3                | 1765                       | 5                    | 25                                                        | 1860                       | 8.0              | FDD            | IMD4 <sup>4</sup>  |
|                                                          |                   |                            |                      |                                                           |                            |                  |                |                    |
|                                                          | n78               | 3435                       | 10                   | 25                                                        | 3435                       | N/A              | TDD            | N/A                |
|                                                          | n3                | N/A                        | 5                    | N/A                                                       | 1877.5                     | 2.2              | FDD            | IMD7 <sup>15</sup> |
|                                                          | n78 <sup>12</sup> | 3305                       | 10                   | 1 (RB <sub>START</sub> =3)                                | 3305                       | N/A              | TDD            | N/A                |
|                                                          |                   | 3780                       | 10                   | 1 (RB <sub>START</sub> =0)                                | 3780                       |                  |                |                    |
| CA_n5-n7                                                 | n5                | 834                        | 5                    | 25                                                        | 879                        | 12               | FDD            | IMD3 <sup>4</sup>  |
|                                                          | n7                | 2547                       | 10                   | 50                                                        | 2667                       | N/A              | FDD            | N/A                |
| CA_n5-n14                                                | n5                | 836                        | 5                    | 25                                                        | 881                        | 25               | FDD            | IMD3 <sup>4</sup>  |
|                                                          | n14               | 791                        | 5                    | 25                                                        | 761                        | N/A              | FDD            | N/A                |
|                                                          | n5                | 826.5                      | 5                    | 25                                                        | 871.5                      | N/A              | FDD            | N/A                |
|                                                          | n14               | 795.5                      | 5                    | 25                                                        | 765.5                      | 25               | FDD            | IMD3               |
| CA_n5-n66                                                | n5                | 838                        | 5                    | 25                                                        | 883                        | 30               | FDD            | IMD2 <sup>4</sup>  |
|                                                          | n66               | 1721                       | 5                    | 25                                                        | 2121                       | N/A              | FDD            | N/A                |
| CA_n5-n77                                                | n5                | N/A                        | N/A                  | N/A                                                       | N/A                        | N/A              | FDD            | IMD2 <sup>7</sup>  |
|                                                          | n77               | N/A                        | N/A                  | N/A                                                       | N/A                        | N/A              | TDD            | N/A                |
|                                                          | n5                | 844                        | 5                    | 25                                                        | 889                        | 8.3              | FDD            | IMD4 <sup>13</sup> |
|                                                          | n77               | 3421                       | 10                   | 50                                                        | 3421                       | N/A              | TDD            | N/A                |
|                                                          | n5                | 829                        | 5                    | 25                                                        | 874                        | 5.5              | FDD            | IMD5 <sup>13</sup> |
|                                                          | n77               | 4190                       | 10                   | 50                                                        | 4190                       | N/A              | TDD            | N/A                |
| CA_n5-n78                                                | n5                | 844                        | 5                    | 25                                                        | 889                        | 8.3              | FDD            | IMD4               |
|                                                          | n78               | 3421                       | 10                   | 50                                                        | 3421                       | N/A              | TDD            | N/A                |
| CA_n7-n40                                                | n7                | 2510                       | 5                    | 25                                                        | 2630                       | 23               | FDD            | IMD3               |
|                                                          | n40               | 2390                       | 5                    | 25                                                        | 2390                       | N/A              | TDD            | N/A                |
| CA_n7-n46                                                | n7                | 2550                       | 10                   | 50                                                        | 2670                       | 26.8             | FDD            | IMD2 <sup>4</sup>  |
|                                                          | n46               | 5220                       | 20                   | 50                                                        | 5220                       | N/A              | TDD            | N/A                |
| CA_n7-n66                                                | n7                | 2535                       | 10                   | 50                                                        | 2655                       | 15               | FDD            | IMD4               |
|                                                          | n66               | 1730                       | 5                    | 25                                                        | 2130                       | N/A              | FDD            | N/A                |
| CA_n7-n77                                                | n7                | 2540                       | 5                    | 25                                                        | 2660                       | 7.1              | FDD            | IMD4               |
|                                                          | n77               | 3870                       | 10                   | 50                                                        | 3870                       | N/A              | TDD            | N/A                |
| CA_n8-n41                                                | n8                | 882.5                      | 5                    | 25                                                        | 927.5                      | 12.1             | FDD            | IMD3 <sup>4</sup>  |

| Band / Channel bandwidth / N <sub>RB</sub> / Duplex mode |         |                            |                      |                                                            |                            |             |                | Source of<br>IMD   |
|----------------------------------------------------------|---------|----------------------------|----------------------|------------------------------------------------------------|----------------------------|-------------|----------------|--------------------|
| NR CA band<br>combination                                | NR band | UL F <sub>c</sub><br>(MHz) | UL/DL<br>BW<br>(MHz) | UL<br>L <sub>CRB</sub>                                     | DL F <sub>c</sub><br>(MHz) | MSD<br>(dB) | Duplex<br>mode |                    |
|                                                          | n41     | 2685                       | 10                   | 50                                                         | 2685                       | N/A         | TDD            | N/A                |
| CA_n8-n78                                                | n8      | 897.5                      | 5                    | 25                                                         | 942.5                      | 8.3         | FDD            | IMD4               |
|                                                          | n78     | 3635                       | 10                   | 50                                                         | 3635                       | N/A         | TDD            | N/A                |
| CA_n8-n79                                                | n8      | 897.5                      | 5                    | 25                                                         | 942.5                      | 4.8         | FDD            | IMD5               |
|                                                          | n79     | 4532.5                     | 40                   | 216                                                        | 4532.5                     | N/A         | TDD            | N/A                |
| CA_n12-n66                                               | n12     | 707.5                      | 5                    | 25                                                         | 737.5                      | N/A         | FDD            | N/A                |
|                                                          | n66     | 1765                       | 5                    | 25                                                         | 2115                       | 5.0         | FDD            | IMD4               |
| CA_n12-n77                                               | n12     | 702                        | 5                    | 20                                                         | 732                        | 5.5         | FDD            | IMD5               |
|                                                          | n77     | 3540                       | 10                   | 50                                                         | 3540                       | N/A         | TDD            | N/A                |
| CA_n13-n77                                               | n13     | 782                        | 5                    | 20                                                         | 751                        | 5.5         | FDD            | IMD5               |
|                                                          | n77     | 3880                       | 10                   | 50                                                         | 3880                       | N/A         | TDD            | N/A                |
| CA_n14-n77                                               | n14     | 793                        | 5                    | 20                                                         | 763                        | 5.5         | FDD            | IMD5               |
|                                                          | n77     | 3935                       | 10                   | 50                                                         | 3935                       | N/A         | TDD            | N/A                |
| CA_n18-n77 <sup>8</sup>                                  | n18     | N/A                        | N/A                  | N/A                                                        | N/A                        | N/A         | FDD            | IMD4/5             |
|                                                          | n77     | N/A                        | N/A                  | N/A                                                        | N/A                        | N/A         | TDD            | N/A                |
| CA_n18-n78 <sup>9</sup>                                  | n18     | N/A                        | N/A                  | N/A                                                        | N/A                        | N/A         | FDD            | IMD4               |
|                                                          | n78     | N/A                        | N/A                  | N/A                                                        | N/A                        | N/A         | TDD            | N/A                |
| CA_n20-n78                                               | n20     | 850                        | 5                    | 25                                                         | 809                        | 11          | FDD            | IMD4               |
|                                                          | n78     | 3359                       | 10                   | 50                                                         | 3359                       | N/A         | TDD            | N/A                |
| CA_n24-n77 <sup>10</sup>                                 | n24     | N/A                        | N/A                  | N/A                                                        | N/A                        | N/A         | FDD            | IMD4               |
|                                                          | n77     | N/A                        | N/A                  | N/A                                                        | N/A                        | N/A         | TDD            | N/A                |
| CA_n25-n41                                               | n25     | N/A                        | 5                    | N/A                                                        | 1992.5                     | 8.5         | FDD            | IMD7               |
|                                                          | n41     | 2545<br>2640               | 90<br>100            | 1 (RB <sub>START</sub> =0)<br>1 (RB <sub>START</sub> =221) | 2545<br>2640               | N/A         | TDD            | N/A                |
| CA_n25-n48                                               | n25     | 1852.5                     | 5                    | 25                                                         | 1932.5                     | 12          | FDD            | IMD4               |
|                                                          | n48     | 3625                       | 20                   | 100                                                        | 3625                       | N/A         | TDD            | N/A                |
| CA_n25-n66                                               | n66     | 1775                       | 5                    | 25                                                         | 2175                       | N/A         | FDD            | N/A                |
|                                                          | n25     | 1855                       | 5                    | 25                                                         | 1935                       | 20          | FDD            | IMD3               |
|                                                          | n66     | 1712.5                     | 5                    | 25                                                         | 2112.5                     | 23          | FDD            | IMD3               |
|                                                          | n25     | 1912.5                     | 5                    | 25                                                         | 1992.5                     | N/A         | FDD            | N/A                |
|                                                          | n66     | 1750                       | 5                    | 25                                                         | 2150                       | 4           | FDD            | IMD5               |
|                                                          | n25     | 1883.3                     | 5                    | 25                                                         | 1963.3                     | N/A         | FDD            | N/A                |
| CA_n25-n77                                               | n25     | 1855                       | 5                    | 25                                                         | 1935                       | 26          | FDD            | IMD2               |
|                                                          | n77     | 3790                       | 10                   | 50                                                         | 3790                       | N/A         | TDD            | N/A                |
|                                                          | n25     | 1900                       | 5                    | 25                                                         | 1980                       | 8.0         | FDD            | IMD4               |
|                                                          | n77     | 3690                       | 10                   | 50                                                         | 3690                       | N/A         | TDD            | N/A                |
|                                                          | n25     | 1885                       | 5                    | 25                                                         | 1965                       | 5           | FDD            | IMD5               |
|                                                          | n77     | 3790                       | 10                   | 50                                                         | 3790                       | N/A         | TDD            | N/A                |
| CA_n25-n78                                               | n25     | 1855                       | 5                    | 25                                                         | 1935                       | 26          | FDD            | IMD2 <sup>4</sup>  |
|                                                          | n78     | 3790                       | 10                   | 50                                                         | 3790                       | N/A         | TDD            | N/A                |
| CA_n26-n66                                               | n26     | 838                        | 5                    | 25                                                         | 883                        | 30          | FDD            | IMD2 <sup>4</sup>  |
|                                                          | n66     | 1721                       | 5                    | 25                                                         | 2121                       | N/A         | FDD            | N/A                |
| CA_n26-n70                                               | n26     | 831                        | 5                    | 25                                                         | 876                        | 30          | FDD            | IMD2 <sup>4</sup>  |
|                                                          | n70     | 1707.5                     | 5                    | 25                                                         | 2007.5                     | N/A         | FDD            | N/A                |
| CA_n28-n50                                               | n28     | 730                        | 10                   | 50                                                         | 775                        | 15.3        | FDD            | IMD2               |
|                                                          | n50     | 1500                       | 10                   | 50                                                         | 1500                       | N/A         | TDD            | N/A                |
|                                                          | n28     | 740                        | 10                   | 50                                                         | 785                        | 6.0         | FDD            | IMD4 <sup>4</sup>  |
|                                                          | n50     | 1500                       | 10                   | 50                                                         | 1500                       | N/A         | TDD            | N/A                |
| CA_n28-n74                                               | n28     | 705.5                      | 5                    | 25                                                         | 760.5                      | 24.6        | FDD            | IMD2               |
|                                                          | n74     | 1466                       | 5                    | 25                                                         | 1514                       | N/A         | FDD            | N/A                |
|                                                          | n28     | 743                        | 5                    | 25                                                         | 798                        | 11.3        | FDD            | IMD4 <sup>11</sup> |
|                                                          | n74     | 1431                       | 5                    | 25                                                         | 1479                       | N/A         | FDD            | N/A                |
|                                                          | n28     | 709                        | 5                    | 25                                                         | 764                        | N/A         | FDD            | N/A                |
|                                                          | n74     | 1466                       | 5                    | 25                                                         | 1514                       | 14.6        | FDD            | IMD4               |
|                                                          | n28     | 735.5                      | 5                    | 25                                                         | 790.5                      | N/A         | FDD            | N/A                |
|                                                          | n74     | 1450.4                     | 5                    | 25                                                         | 1498.4                     | 2.5         | FDD            | IMD5               |



| Band / Channel bandwidth / N <sub>RB</sub> / Duplex mode |                   |                         |                |                                                            |                         |          |             | Source of IMD      |
|----------------------------------------------------------|-------------------|-------------------------|----------------|------------------------------------------------------------|-------------------------|----------|-------------|--------------------|
| NR CA band combination                                   | NR band           | UL F <sub>c</sub> (MHz) | UL/DL BW (MHz) | UL L <sub>CRB</sub>                                        | DL F <sub>c</sub> (MHz) | MSD (dB) | Duplex mode |                    |
| CA_n28-n77                                               | n28               | N/A                     | N/A            | N/A                                                        | N/A                     | N/A      | FDD         | IMD2 <sup>7</sup>  |
|                                                          | n77               | N/A                     | N/A            | N/A                                                        | N/A                     | N/A      | TDD         | N/A                |
|                                                          | n28               | 705.5                   | 5              | 25                                                         | 760.5                   | 5.5      | FDD         | IMD5               |
|                                                          | n77/n78           | 3582.5                  | 10             | 50                                                         | 3582.5                  | N/A      | TDD         | N/A                |
|                                                          | n28               | N/A                     | 5              | N/A                                                        | 705.5                   | [8.6]    | FDD         | IMD4               |
|                                                          | n77 <sup>12</sup> | 3455<br>3805            | 10<br>10       | 1 (RB <sub>START</sub> =17)<br>1 (RB <sub>START</sub> =0)  | 3455<br>3805            | N/A      | TDD         | N/A                |
| CA_n30-n77                                               | n30               | 2310                    | 5              | 25                                                         | 2355                    | 8.0      | FDD         | IMD4               |
|                                                          | n77               | 3487.5                  | 10             | 50                                                         | 3487.5                  | N/A      | TDD         | N/A                |
|                                                          | n30               | N/A                     | 5              | N/A                                                        | 2352.5                  | 3.2      | FDD         | IMD7               |
|                                                          | n77 <sup>12</sup> | 3455<br>3825            | 10<br>10       | 1 (RB <sub>START</sub> =17)<br>1 (RB <sub>START</sub> =0)  | 3455<br>3825            | N/A      | TDD         | N/A                |
| CA_n41-n66                                               | n41               | 2545<br>2640            | 90<br>100      | 1 (RB <sub>START</sub> =0)<br>1 (RB <sub>START</sub> =171) | 2545<br>2640            | N/A      | TDD         | N/A                |
|                                                          | n66               | N/A                     | 5              | N/A                                                        | 2197.5                  | 32.5     | FDD         | IMD5               |
| CA_n41-n71                                               | n41               | 2614                    | 5              | 25                                                         | 2614                    | N/A      | TDD         | N/A                |
|                                                          | n71               | 665                     | 5              | 25                                                         | 619                     | 11       | FDD         | IMD4               |
|                                                          | n41               | 2545<br>2625            | 60<br>100      | 1 (RB <sub>START</sub> =0)<br>1 (RB <sub>START</sub> =272) | 2545<br>2625            | N/A      | TDD         | N/A                |
|                                                          | n77               | N/A                     | 10             | N/A                                                        | 3305                    | 2.7      | FDD         | IMD9               |
| CA_n48-n66                                               | n48               | 3660                    | 5              | 25                                                         | 3660                    | N/A      | TDD         | N/A                |
|                                                          | n66               | 1730                    | 5              | 25                                                         | 2130                    | 5.0      | FDD         | IMD5               |
| CA_n48-n70                                               | n70               | 1697.5                  | 25/15          | 25                                                         | 1997.5                  | 26       | FDD         | IMD2 <sup>4</sup>  |
|                                                          | n48               | 3695                    | 10             | 50                                                         | 3695                    | N/A      | TDD         | N/A                |
| CA_n66-n71                                               | n66               | 1750                    | 5              | 25                                                         | 2150                    | 5        | FDD         | IMD4               |
|                                                          | n71               | 675                     | 5              | 25                                                         | 629                     | N/A      | FDD         | N/A                |
| CA_n66-n77                                               | n66               | 1775                    | 5              | 25                                                         | 2175                    | 31       | FDD         | IMD2               |
|                                                          | n77               | 3950                    | 10             | 50                                                         | 3950                    | N/A      | TDD         | N/A                |
|                                                          | n66               | 1760                    | 5              | 25                                                         | 2160                    | 5.0      | FDD         | IMD5               |
|                                                          | n77               | 3720                    | 10             | 50                                                         | 3720                    | N/A      | TDD         | N/A                |
|                                                          | n66               | N/A                     | 5              | N/A                                                        | 2197.5                  | 15       | FDD         | IMD5 <sup>13</sup> |
|                                                          | n77 <sup>12</sup> | 3305<br>3855            | 10<br>10       | 1 (RB <sub>START</sub> =0)<br>1 (RB <sub>START</sub> =8)   | 3305<br>3855            | N/A      | TDD         | N/A                |
|                                                          | n66               | N/A                     | 5              | N/A                                                        | 2197.5                  | 1.7      | FDD         | IMD7               |
|                                                          | n77 <sup>12</sup> | 3455<br>3875            | 10<br>10       | 1 (RB <sub>START</sub> =10)<br>1 (RB <sub>START</sub> =0)  | 3455<br>3875            | N/A      | TDD         | N/A                |
| CA_n66-n78                                               | n66               | 1730                    | 5              | 25                                                         | 2130                    | 5.0      | FDD         | IMD5               |
|                                                          | n78               | 3660                    | 10             | 50                                                         | 3660                    | N/A      | TDD         | N/A                |
| CA_n70-n71                                               | n70               | 1697.5                  | 5              | 25                                                         | 1997.5                  | 5        | FDD         | IMD4               |
|                                                          | n71               | 695.5                   | 5              | 25                                                         | 649.5                   | N/A      | FDD         | N/A                |
| CA_n70-n78                                               | n70               | 1705                    | 5              | 25                                                         | 2005                    | 31       | FDD         | IMD2               |
|                                                          | n78               | 3710                    | 10             | 50                                                         | 3710                    | N/A      | TDD         | N/A                |
|                                                          | n70               | 1705                    | 5              | 25                                                         | 2005                    | 5.0      | FDD         | IMD5               |
|                                                          | n78               | 3560                    | 10             | 50                                                         | 3560                    | N/A      | TDD         | N/A                |
| CA_n71-n77                                               | n71               | 671                     | 5              | 25                                                         | 625                     | 5.5      | FDD         | IMD5 <sup>13</sup> |
|                                                          | n77               | 3309                    | 10             | 50                                                         | 3309                    | N/A      | TDD         | N/A                |
| CA_n71-n78                                               | n71               | 681.5                   | 5              | 25                                                         | 635.5                   | 5.5      | FDD         | IMD5               |
|                                                          | n78               | 3361.5                  | 10             | 50                                                         | 3361.5                  | N/A      | TDD         | N/A                |

NOTE 1: Both of the transmitters shall be set min(+20 dBm, P<sub>C<sub>MAX</sub>,L,f,c</sub>) as defined in clause 6.2A.4

NOTE 2: RB<sub>START</sub> = 0, 15 kHz SCS is assumed.

NOTE 3: No requirements apply when there is at least one individual RE within the intermodulation generated by the dual uplink is within the downlink transmission bandwidth of the FDD band. The reference sensitivity should only be verified when this is not the case (the requirements specified in clause 7.3 apply).

NOTE 4: This band is subject to IMD5 also which MSD is not specified.

NOTE 5: Void.

| Band / Channel bandwidth / N <sub>RB</sub> / Duplex mode                                                                                                                                                                                                                                                                                                                                               |         |                            |                      |                        |                            |             |                | Source of<br>IMD |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------|----------------------|------------------------|----------------------------|-------------|----------------|------------------|
| NR CA band<br>combination                                                                                                                                                                                                                                                                                                                                                                              | NR band | UL F <sub>c</sub><br>(MHz) | UL/DL<br>BW<br>(MHz) | UL<br>L <sub>CRB</sub> | DL F <sub>c</sub><br>(MHz) | MSD<br>(dB) | Duplex<br>mode |                  |
| NOTE 6: Considering the spectrum holdings of the operator for CA_n77(2A) (when one uplink sub block is assigned within 3300-3400MHz, the other uplink sub block is not assigned within 4000-4200MHz or vice versa), no IMD5 result will fall in Rx frequency range of band n3. Therefore, no MSD requirement apply for this CA configuration when two uplink sub blocks are assigned within CA_77(2A). |         |                            |                      |                        |                            |             |                |                  |
| NOTE 7: In current release the maximum separation bandwidth class is 600MHz, therefore, no IMD2 MSD requirement apply for this CA configuration when two uplink sub blocks are assigned within CA_77(2A).                                                                                                                                                                                              |         |                            |                      |                        |                            |             |                |                  |
| NOTE8: There is no IMD4/5 products in band n18 downlink for n77 operating in 3520 – 3560 MHz, 3700 – 3800MHz and 4000 - 4100MHz frequency range.                                                                                                                                                                                                                                                       |         |                            |                      |                        |                            |             |                |                  |
| NOTE 9: There is no IMD4 product in band n18 downlink for n78 operating in 3520 – 3560MHz and 3700-3800MHz frequency range.                                                                                                                                                                                                                                                                            |         |                            |                      |                        |                            |             |                |                  |
| NOTE 10: There is no IMD4 product in band n24 downlink for n77 operating in 3450 – 3980 MHz and n24 uplink restricted to between 1627.5 – 1637.5 MHz and between 1646.5 – 1656.5 MHz.                                                                                                                                                                                                                  |         |                            |                      |                        |                            |             |                |                  |
| NOTE 11: This band is subject to IMD5 also which MSD is not specified..                                                                                                                                                                                                                                                                                                                                |         |                            |                      |                        |                            |             |                |                  |
| NOTE 12: This band supports intra-band non-contiguous uplink configuration.                                                                                                                                                                                                                                                                                                                            |         |                            |                      |                        |                            |             |                |                  |
| NOTE 13: For a UE which supports this band combination only when the Band n77 frequency range restriction defined in NOTE 12 of Table 5.2-1 applies, the MSD test point(s) cannot be verified for the band combination and the test point(s) can be skipped.                                                                                                                                           |         |                            |                      |                        |                            |             |                |                  |
| NOTE 14: For a UE which supports this band combination only when the Band n41 frequency range restriction of 2515 – 2675 MHz applies, the MSD test point(s) cannot be verified for the band combination and the test point(s) can be skipped.                                                                                                                                                          |         |                            |                      |                        |                            |             |                |                  |
| NOTE 15: For a UE which supports this band combination only when the Band n78 frequency range restriction of 3400 – 3800 MHz or 3300 – 3600 MHz applies, the MSD test point(s) cannot be verified for the band combination and the test point(s) can be skipped.                                                                                                                                       |         |                            |                      |                        |                            |             |                |                  |

**Table 7.3A.5-1a: 2DL/2UL inter-band Reference sensitivity QPSK P<sub>REFSENS</sub> and uplink/downlink configurations for PC2 CA**

| Band / Channel bandwidth / N <sub>RB</sub> / Duplex mode |         |                            |                      |                        |                            |             |                | Source of<br>IMD |
|----------------------------------------------------------|---------|----------------------------|----------------------|------------------------|----------------------------|-------------|----------------|------------------|
| NR CA<br>Configuration                                   | NR band | UL F <sub>c</sub><br>(MHz) | UL/DL<br>BW<br>(MHz) | UL<br>L <sub>CRB</sub> | DL F <sub>c</sub><br>(MHz) | MSD<br>(dB) | Duplex<br>mode |                  |
| CA_n1-n78                                                | n1      | 1950                       | 5                    | 25                     | 2140                       | 17.8        | FDD            | IMD4             |
|                                                          | n78     | 3710                       | 10                   | 50                     | 3710                       | N/A         | TDD            | N/A              |
| CA_n3-n41                                                | n3      | 1740                       | 5                    | 25                     | 1835                       | 18.4        | FDD            | IMD4             |
|                                                          | n41     | 2657.5                     | 10                   | 50                     | 2657.5                     | N/A         | TDD            | N/A              |
| CA_n3-n78                                                | n3      | 1740                       | 5                    | 25                     | 1835                       | 31.9        | FDD            | IMD2             |
|                                                          | n78     | 3575                       | 10                   | 50                     | 3575                       | N/A         | TDD            | N/A              |
|                                                          | n3      | 1765                       | 5                    | 25                     | 1860                       | 18.5        | FDD            | IMD4             |
|                                                          | n78     | 3435                       | 10                   | 50                     | 3435                       | N/A         | TDD            | N/A              |
| CA_n2-n77 <sup>4</sup>                                   | n2      | 1855                       | 5                    | 25                     | 1935                       | 32.10       | FDD            | IMD2             |
|                                                          | n77     | 3790                       | 10                   | 50                     | 3790                       | N/A         | TDD            | N/A              |
|                                                          | n2      | 1900                       | 5                    | 25                     | 1980                       | 19.10       | FDD            | IMD4             |
|                                                          | n77     | 3720                       | 10                   | 50                     | 3720                       | N/A         | TDD            | N/A              |
| CA_n5-n77 <sup>4,6</sup>                                 | 5       | 844                        | 5                    | 25                     | 889                        | 18.6        | FDD            | IMD4             |
|                                                          | n77     | 3421                       | 10                   | 50                     | 3421                       | N/A         | TDD            | N/A              |
| CA_n5-n78                                                | n5      | 844                        | 5                    | 25                     | 889                        | 18.6        | FDD            | IMD4             |
|                                                          | n78     | 3421                       | 10                   | 50                     | 3421                       | N/A         | TDD            | N/A              |
| CA_n12-n77                                               | 12      | 702                        | 5                    | 20                     | 732                        | 11.7        | FDD            | IMD5             |
|                                                          | n77     | 3540                       | 10                   | 50                     | 3540                       | N/A         | TDD            | N/A              |
| CA_n13-n77                                               | 13      | 782                        | 5                    | 20                     | 751                        | 20.5        | FDD            | IMD5             |
|                                                          | n77     | 3880                       | 10                   | 50                     | 3880                       | N/A         | TDD            | N/A              |
| CA_n14-n77                                               | 14      | 795.5                      | 5                    | 15                     | 765.5                      | 11.7        | FDD            | IMD5             |
|                                                          | n77     | 3947.5                     | 10                   | 50                     | 3947.5                     | N/A         | TDD            | N/A              |
| CA_n25-n77 <sup>4</sup>                                  | n25     | 1855                       | 5                    | 25                     | 1935                       | 32.1        | FDD            | IMD2             |
|                                                          | n77     | 3790                       | 10                   | 50                     | 3790                       | N/A         | TDD            | N/A              |
|                                                          | n25     | 1900                       | 5                    | 25                     | 1980                       | 19.1        | FDD            | IMD4             |
|                                                          | n77     | 3720                       | 10                   | 50                     | 3720                       | N/A         | TDD            | N/A              |
| CA_n30-n77                                               | 30      | 2310                       | 5                    | 25                     | 2355                       | 17.6        | FDD            | IMD4             |
|                                                          | n77     | 3487.5                     | 10                   | 50                     | 3487.5                     | N/A         | TDD            | N/A              |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |        |    |    |        |       |     |      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|----|----|--------|-------|-----|------|
| CA_n41-n71                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | n41 | 2614   | 5  | 25 | 2614   | N/A   | TDD | N/A  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | n71 | 665    | 5  | 25 | 619    | 16.3  | FDD | IMD4 |
| CA_n66-n77                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | n66 | 1775   | 5  | 25 | 2175   | 34.33 | FDD | IMD2 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | n77 | 3950   | 10 | 50 | 3950   | N/A   | TDD | N/A  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | n66 | 1760   | 5  | 25 | 2160   | 11.27 | FDD | IMD5 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | n77 | 3720   | 10 | 50 | 3720   | N/A   | TDD | N/A  |
| CA_n71-n77 <sup>6</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | n71 | 681.5  | 5  | 25 | 635.5  | 11.4  | FDD | IMD5 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | n77 | 3361.5 | 10 | 50 | 3361.5 | N/A   | TDD | N/A  |
| <p>NOTE 1: Both of the transmitters shall be set min(+23 dBm, <math>P_{\text{CMAX\_L,f,c}}</math>) as defined in clause 6.2A.4</p> <p>NOTE 2: <math>R_{\text{BSTART}} = 0</math>, 15 kHz SCS is assumed.</p> <p>NOTE 3: No requirements apply when there is at least one individual RE within the intermodulation generated by the dual uplink is within the downlink transmission bandwidth of the FDD band. The reference sensitivity should only be verified when this is not the case (the requirements specified in clause 7.3 apply).</p> <p>NOTE 4: This band is subject to IMD5 also which MSD is not specified.</p> <p>NOTE 5: Void.</p> <p>NOTE 6: For a UE which supports this band combination only when the Band n77 frequency range restriction defined in NOTE 12 of Table 5.2-1 applies, the MSD test point(s) cannot be verified for the band combination and the test point(s) can be skipped.</p> |     |        |    |    |        |       |     |      |

**Table 7.3A.5-2: 3DL/2UL interband Reference sensitivity QPSK  $P_{\text{REFSENS}}$  and uplink/downlink configurations for PC3 CA**

| Band / Channel bandwidth / $N_{\text{RB}}$ / Duplex mode |         |                |                |                     |                |          |             | Source of IMD       |
|----------------------------------------------------------|---------|----------------|----------------|---------------------|----------------|----------|-------------|---------------------|
| NR CA band combination                                   | NR band | UL $F_c$ (MHz) | UL/DL BW (MHz) | UL $L_{\text{CRB}}$ | DL $F_c$ (MHz) | MSD (dB) | Duplex mode |                     |
| CA_n1-n3-n28                                             | n1      | 1975           | 5              | 25                  | 2165           | N/A      | FDD         | N/A                 |
|                                                          | n28     | 710.5          | 5              | 25                  | 765.5          | N/A      | FDD         | N/A                 |
|                                                          | n3      | N/A            | 5              | N/A                 | 1818.5         | 4.0      | FDD         | IMD5                |
|                                                          | n3      | 1780           | 5              | 25                  | 1875           | N/A      | FDD         | N/A                 |
|                                                          | n28     | 710.5          | 5              | 25                  | 765.5          | N/A      | FDD         | N/A                 |
| CA_n1-n3-n41                                             | n1      | N/A            | 5              | N/A                 | 2139           | 11.0     | FDD         | IMD4                |
|                                                          | n1      | 1977.5         | 5              | 25                  | 2167.5         | N/A      | FDD         | N/A                 |
|                                                          | n3      | 1712.5         | 5              | 25                  | 1807.5         | N/A      | FDD         | N/A                 |
| CA_n1-n3-n77                                             | n41     | N/A            | 10             | N/A                 | 2507.5         | 5.0      | TDD         | IMD5                |
|                                                          | n1      | 1950           | 5              | 25                  | 2140           | N/A      | FDD         | N/A                 |
|                                                          | n3      | 1750           | 5              | 25                  | 1845           | N/A      | FDD         | N/A                 |
|                                                          | n77     | N/A            | 10             | N/A                 | 3700           | 28.4     | TDD         | IMD2 <sup>2</sup>   |
|                                                          | n1      | 1950           | 5              | 25                  | 2140           | N/A      | FDD         | N/A                 |
|                                                          | n3      | N/A            | 5              | N/A                 | 1807.5         | 31.5     | FDD         | IMD2 <sup>1,2</sup> |
|                                                          | n77     | 3757.5         | 10             | 50                  | 3757.5         | N/A      | TDD         | N/A                 |
|                                                          | n1      | N/A            | 5              | N/A                 | 2140           | 31.0     | FDD         | IMD2 <sup>1</sup>   |
|                                                          | n3      | 1775           | 5              | 25                  | 1870           | N/A      | FDD         | N/A                 |
| CA_n1-n3-n78                                             | n77     | 3915           | 10             | 50                  | 3915           | N/A      | TDD         | N/A                 |
|                                                          | n1      | 1950           | 5              | 25                  | 2140           | N/A      | FDD         | N/A                 |
|                                                          | n3      | 1750           | 5              | 25                  | 1845           | N/A      | FDD         | N/A                 |
|                                                          | n78     | N/A            | 10             | N/A                 | 3700           | 28.4     | TDD         | IMD2                |
|                                                          | n1      | 1950           | 5              | 25                  | 2140           | N/A      | FDD         | N/A                 |
|                                                          | n3      | 1770           | 5              | 25                  | 1865           | N/A      | FDD         | N/A                 |
|                                                          | n78     | N/A            | 10             | N/A                 | 3360           | 11.2     | TDD         | IMD4                |
|                                                          | n1      | 1950           | 5              | 25                  | 2140           | N/A      | FDD         | N/A                 |
|                                                          | n3      | N/A            | 5              | N/A                 | 1830           | 27.9     | FDD         | IMD2                |
| CA_n1-n3-n79                                             | n78     | 3780           | 10             | 52                  | 3780           | N/A      | TDD         | N/A                 |
|                                                          | n1      | 1930           | 5              | 25                  | 2120           | N/A      | FDD         | N/A                 |
|                                                          | n3      | 1720           | 5              | 25                  | 1815           | N/A      | FDD         | N/A                 |
|                                                          | n79     | N/A            | 40             | N/A                 | 4950           | 4.7      | TDD         | IMD5                |
|                                                          | n3      | 1750           | 5              | 25                  | 1845           | N/A      | FDD         | N/A                 |
|                                                          | n79     | 4860           | 40             | 216                 | 4860           | N/A      | TDD         | N/A                 |
| CA_n1-n5-n7                                              | n1      | N/A            | 5              | N/A                 | 2140           | 3.6      | FDD         | IMD5                |
|                                                          | n1      | 1968           | 5              | 25                  | 2158           | N/A      | FDD         | N/A                 |
|                                                          | n7      | 2512           | 10             | 50                  | 2632           | N/A      | FDD         | N/A                 |
| CA_n1-n5-n78                                             | n5      | N/A            | 5              | N/A                 | 880            | 1.0      | FDD         | IMD5                |
|                                                          | n1      | N/A            | 5              | N/A                 | 2122           | 18.1     | FDD         | IMD3                |
|                                                          | n5      | 829            | 5              | 25                  | 874            | N/A      | FDD         | N/A                 |

| Band / Channel bandwidth / N <sub>RB</sub> / Duplex mode |         |                         |                |                     |                         |          |             | Source of IMD     |
|----------------------------------------------------------|---------|-------------------------|----------------|---------------------|-------------------------|----------|-------------|-------------------|
| NR CA band combination                                   | NR band | UL F <sub>c</sub> (MHz) | UL/DL BW (MHz) | UL L <sub>CRB</sub> | DL F <sub>c</sub> (MHz) | MSD (dB) | Duplex mode |                   |
|                                                          | n78     | 3780                    | 10             | 50                  | 3780                    | N/A      | TDD         | N/A               |
|                                                          | n1      | 1975                    | 5              | 25                  | 2165                    | N/A      | FDD         | N/A               |
|                                                          | n5      | N/A                     | 5              | N/A                 | 885                     | 3.1      | FDD         | IMD5              |
|                                                          | n78     | 3405                    | 10             | 50                  | 3405                    | N/A      | TDD         | N/A               |
|                                                          | n1      | 1950                    | 5              | 25                  | 2140                    | N/A      | FDD         | N/A               |
|                                                          | n5      | 830                     | 5              | 25                  | 875                     | N/A      | FDD         | N/A               |
|                                                          | n78     | N/A                     | 10             | N/A                 | 3610                    | 15.7     | TDD         | IMD3              |
| CA_n1-n7-n8                                              | n1      | 1977.5                  | 5              | 25                  | 2167.5                  | N/A      | FDD         | N/A               |
|                                                          | n7      | 2502.5                  | 5              | 25                  | 2622.5                  | N/A      | FDD         | N/A               |
|                                                          | n8      | N/A                     | 5              | N/A                 | 927.5                   | 1.0      | FDD         | IMD5              |
| CA_n1-n7-n28                                             | n1      | 1935                    | 5              | 25                  | 2125                    | N/A      | FDD         | N/A               |
|                                                          | n7      | N/A                     | 10             | N/A                 | 2653                    | 30.0     | FDD         | IMD2              |
|                                                          | n28     | 718                     | 5              | 25                  | 773                     | N/A      | FDD         | N/A               |
|                                                          | n1      | 1935                    | 5              | 25                  | 2125                    | N/A      | FDD         | N/A               |
|                                                          | n7      | 2510                    | 10             | 50                  | 2630                    | N/A      | FDD         | N/A               |
|                                                          | n28     | N/A                     | 10             | N/A                 | 785                     | 4.5      | FDD         | IMD5              |
| CA_n1-n7-n40                                             | n1      | 1970                    | 5              | 25                  | 2160                    | N/A      | FDD         | N/A               |
|                                                          | n7      | N/A                     | 5              | N/A                 | 2630                    | 23       | FDD         | IMD3              |
|                                                          | n40     | 2390                    | 5              | 25                  | 2390                    | N/A      | TDD         | N/A               |
|                                                          | n1      | N/A                     | 5              | N/A                 | 2120                    | 16.4     | FDD         | IMD3              |
|                                                          | n7      | 2530                    | 5              | 25                  | 2650                    | N/A      | FDD         | N/A               |
|                                                          | n40     | 2310                    | 5              | 25                  | 2310                    | N/A      | TDD         | N/A               |
| CA_n1-n7-n78                                             | n1      | 1977.5                  | 5              | 25                  | 2167.5                  | N/A      | FDD         | N/A               |
|                                                          | n7      | N/A                     | 5              | N/A                 | 2627.5                  | 9.1      | FDD         | IMD4              |
|                                                          | n78     | 3305                    | 10             | 50                  | 3305                    | N/A      | TDD         | N/A               |
|                                                          | n1      | N/A                     | 5              | N/A                 | 2140                    | 8.7      | FDD         | IMD4              |
|                                                          | n7      | 2510                    | 10             | 50                  | 2630                    | N/A      | FDD         | N/A               |
|                                                          | n78     | 3580                    | 10             | 50                  | 3580                    | N/A      | TDD         | N/A               |
|                                                          | n1      | 1970                    | 5              | 25                  | 2160                    | N/A      | FDD         | N/A               |
|                                                          | n7      | 2520                    | 5              | 25                  | 2640                    | N/A      | FDD         | N/A               |
|                                                          | n78     | N/A                     | 10             | N/A                 | 3390                    | 10.1     | TDD         | IMD4              |
| CA_n1-n8-n40                                             | n1      | 1930                    | 5              | 25                  | 2120                    | N/A      | FDD         | N/A               |
|                                                          | n8      | N/A                     | 5              | N/A                 | 930                     | 8.0      | FDD         | IMD4              |
|                                                          | n40     | 2395                    | 5              | 25                  | 2395                    | N/A      | TDD         | N/A               |
| CA_n1-n8-n78                                             | n1      | 1945                    | 5              | 25                  | 2135                    | N/A      | FDD         | N/A               |
|                                                          | n8      | 900                     | 5              | 25                  | 945                     | N/A      | FDD         | N/A               |
|                                                          | n78     | N/A                     | 10             | N/A                 | 3745                    | 14.9     | TDD         | IMD3              |
|                                                          | n1      | 1940                    | 5              | 25                  | 2130                    | N/A      | FDD         | N/A               |
|                                                          | n8      | N/A                     | 5              | N/A                 | 940                     | 3.3      | FDD         | IMD5              |
|                                                          | n78     | 3380                    | 10             | 50                  | 3380                    | N/A      | TDD         | N/A               |
| CA_n1-n18-n28                                            | n1      | 1965                    | 5              | 25                  | 2155                    | N/A      | FDD         | N/A               |
|                                                          | n28     | 708                     | 5              | 25                  | 763                     | N/A      | FDD         | N/A               |
|                                                          | n18     | N/A                     | 5              | N/A                 | 867                     | 4.6      | FDD         | IMD5              |
|                                                          | n18     | 825                     | 5              | 25                  | 870                     | N/A      | FDD         | N/A               |
|                                                          | n28     | 738                     | 5              | 25                  | 793                     | N/A      | FDD         | N/A               |
|                                                          | n1      | N/A                     | 5              | N/A                 | 2127                    | 4        | FDD         | IMD5              |
| CA_n1-n18-n41                                            | n1      | 1960                    | 5              | 25                  | 2150                    | N/A      | FDD         | N/A               |
|                                                          | n41     | 2505                    | 10             | 50                  | 2505                    | N/A      | TDD         | N/A               |
|                                                          | n18     | N/A                     | 5              | N/A                 | 870                     | 3.3      | FDD         | IMD5              |
| CA_n1-n18-n77                                            | n1      | 1950                    | 5              | 25                  | 2140                    | N/A      | FDD         | N/A               |
|                                                          | n18     | 825                     | 5              | 25                  | 870                     | N/A      | FDD         | N/A               |
|                                                          | n77     | N/A                     | 10             | N/A                 | 3600                    | 15.7     | TDD         | IMD3 <sup>1</sup> |
|                                                          | n1      | 1970                    | 5              | 25                  | 2160                    | N/A      | FDD         | N/A               |
|                                                          | n77     | 3390                    | 10             | 50                  | 3390                    | N/A      | TDD         | N/A               |
|                                                          | n18     | N/A                     | 5              | N/A                 | 870                     | 3.5      | FDD         | IMD5              |
|                                                          | n1      | N/A                     | 5              | N/A                 | 2120                    | 16.4     | FDD         | IMD3              |
|                                                          | n18     | 825                     | 5              | 25                  | 870                     | N/A      | FDD         | N/A               |
|                                                          | n77     | 3770                    | 10             | 50                  | 3770                    | N/A      | TDD         | N/A               |
| CA_n1-n28-n41                                            | n1      | 1935                    | 5              | 25                  | 2125                    | N/A      | FDD         | N/A               |
|                                                          | n28     | 718                     | 5              | 25                  | 773                     | N/A      | FDD         | N/A               |

| Band / Channel bandwidth / N <sub>RB</sub> / Duplex mode |         |                            |                      |                        |                            |             |                | Source of<br>IMD     |
|----------------------------------------------------------|---------|----------------------------|----------------------|------------------------|----------------------------|-------------|----------------|----------------------|
| NR CA band<br>combination                                | NR band | UL F <sub>c</sub><br>(MHz) | UL/DL<br>BW<br>(MHz) | UL<br>L <sub>CRB</sub> | DL F <sub>c</sub><br>(MHz) | MSD<br>(dB) | Duplex<br>mode |                      |
|                                                          | n41     | N/A                        | 10                   | N/A                    | 2653                       | 30.1        | TDD            | IMD2 <sup>2</sup>    |
|                                                          | n1      | 1923                       | 5                    | 25                     | 2113                       | N/A         | FDD            | N/A                  |
|                                                          | n41     | 2685                       | 10                   | 50                     | 2685                       | N/A         | TDD            | N/A                  |
|                                                          | n28     | N/A                        | 5                    | N/A                    | 762                        | 29.3        | FDD            | IMD2 <sup>1</sup>    |
| CA_n1-n28-n77                                            | n1      | 1950                       | 5                    | 25                     | 2140                       | N/A         | FDD            | N/A                  |
|                                                          | n28     | 733                        | 5                    | 25                     | 788                        | N/A         | FDD            | N/A                  |
|                                                          | n77     | N/A                        | 10                   | N/A                    | 3416                       | 15.7        | TDD            | IMD3 <sup>2</sup>    |
|                                                          | n1      | 1950                       | 5                    | 25                     | 2140                       | N/A         | FDD            | N/A                  |
|                                                          | n77     | 3320                       | 10                   | 50                     | 3320                       | N/A         | TDD            | N/A                  |
|                                                          | n28     | N/A                        | 5                    | N/A                    | 790                        | 4.2         | FDD            | IMD5                 |
|                                                          | n28     | 740                        | 5                    | 25                     | 795                        | N/A         | FDD            | N/A                  |
|                                                          | n77     | 3630                       | 10                   | 50                     | 3630                       | N/A         | TDD            | N/A                  |
|                                                          | n1      | N/A                        | 5                    | N/A                    | 2150                       | 15.7        | FDD            | IMD3                 |
|                                                          | n1      | N/A                        | 5                    | N/A                    | 2150                       | 15.7        | FDD            | IMD3                 |
| CA_n1-n28-n78                                            | n28     | 740                        | 5                    | 25                     | 795                        | N/A         | FDD            | N/A                  |
|                                                          | n78     | 3630                       | 10                   | 50                     | 3630                       | N/A         | TDD            | N/A                  |
|                                                          | n1      | 1970                       | 5                    | 25                     | 2160                       | N/A         | FDD            | N/A                  |
|                                                          | n28     | N/A                        | 5                    | N/A                    | 794                        | 4.2         | FDD            | IMD5                 |
|                                                          | n78     | 3352                       | 10                   | 50                     | 3352                       | N/A         | TDD            | N/A                  |
|                                                          | n1      | 1950                       | 5                    | 25                     | 2140                       | N/A         | FDD            | N/A                  |
|                                                          | n28     | 733                        | 5                    | 25                     | 788                        | N/A         | FDD            | N/A                  |
|                                                          | n78     | N/A                        | 10                   | N/A                    | 3416                       | 15.7        | TDD            | IMD3                 |
| CA_n1A-n28A-n79A                                         | n1      | 1950                       | 5                    | 25                     | 2140                       | N/A         | FDD            | N/A                  |
|                                                          | n28     | 730                        | 5                    | 25                     | 785                        | N/A         | FDD            | N/A                  |
|                                                          | n79     | N/A                        | 40                   | N/A                    | 4630                       | 14.9        | TDD            | IMD3 <sup>1</sup>    |
|                                                          | n1      | 1930                       | 5                    | 25                     | 2120                       | N/A         | FDD            | N/A                  |
|                                                          | n79     | 4648                       | 40                   | 216                    | 4648                       | N/A         | TDD            | N/A                  |
|                                                          | n28     | N/A                        | 5                    | N/A                    | 788                        | 15.2        | FDD            | IMD3 <sup>2</sup>    |
|                                                          | n28     | 745.5                      | 5                    | 25                     | 800.5                      | N/A         | FDD            | N/A                  |
|                                                          | n79     | 4420                       | 40                   | 216                    | 4420                       | N/A         | TDD            | N/A                  |
| CA_n1-n40-n78                                            | n1      | N/A                        | 5                    | N/A                    | 2167.5                     | 1.2         | FDD            | IMD4 <sup>1</sup>    |
|                                                          | n1      | 1930                       | 5                    | 25                     | 2120                       | N/A         | FDD            | N/A                  |
|                                                          | n40     | 2310                       | 5                    | 25                     | 2310                       | N/A         | TDD            | N/A                  |
|                                                          | n78     | N/A                        | 10                   | N/A                    | 3480                       | 9.8         | TDD            | IMD4 <sup>1</sup>    |
|                                                          | n1      | 1930                       | 5                    | 25                     | 2120                       | N/A         | FDD            | N/A                  |
|                                                          | n40     | N/A                        | 5                    | N/A                    | 2340                       | 10.6        | TDD            | IMD4                 |
|                                                          | n78     | 3450                       | 10                   | 50                     | 3450                       | N/A         | TDD            | N/A                  |
|                                                          | n1      | N/A                        | 5                    | N/A                    | 2140                       | 9.1         | FDD            | IMD4                 |
| CA_n1-n41-n77                                            | n40     | 2380                       | 5                    | 25                     | 2380                       | N/A         | TDD            | N/A                  |
|                                                          | n78     | 3450                       | 10                   | 50                     | 3450                       | N/A         | TDD            | N/A                  |
|                                                          | n1      | 1970                       | 5                    | 25                     | 2160                       | N/A         | FDD            | N/A                  |
|                                                          | n41     | 2650                       | 10                   | 50                     | 2650                       | N/A         | TDD            | N/A                  |
|                                                          | n77     | N/A                        | 10                   | N/A                    | 3330                       | 19.6        | TDD            | IMD3 <sup>1, 2</sup> |
|                                                          | n1      | 1975                       | 5                    | 10                     | 2165                       | N/A         | FDD            | N/A                  |
|                                                          | n77     | 3410                       | 10                   | 50                     | 3410                       | N/A         | TDD            | N/A                  |
|                                                          | n41     | N/A                        | 10                   | N/A                    | 2515                       | 11.5        | TDD            | IMD4 <sup>1</sup>    |
| CA_n1-n77-n79                                            | n41     | 2640                       | 10                   | 50                     | 2640                       | N/A         | TDD            | N/A                  |
|                                                          | n77     | 3710                       | 10                   | 50                     | 3710                       | N/A         | TDD            | N/A                  |
|                                                          | n1      | N/A                        | 5                    | N/A                    | 2140                       | 9.3         | FDD            | IMD4                 |
| CA_n1-n78-n79                                            | n1      | N/A                        | 5                    | N/A                    | 2140                       | 6.0         | FDD            | IMD3 <sup>1,2</sup>  |
|                                                          | n77     | 3400                       | 10                   | 50                     | 3400                       | N/A         | TDD            | N/A                  |
|                                                          | n79     | 4660                       | 40                   | 216                    | 4660                       | N/A         | TDD            | N/A                  |
| CA_n1-n78-n79                                            | n1      | 1950                       | 5                    | 25                     | 2140                       | N/A         | FDD            | N/A                  |
|                                                          | n78     | 3410                       | 10                   | 50                     | 3410                       | N/A         | TDD            | N/A                  |
|                                                          | n79     | N/A                        | 40                   | N/A                    | 4870                       | 15.9        | TDD            | IMD3 <sup>1,3</sup>  |
|                                                          | n1      | 1950                       | 5                    | 25                     | 2140                       | N/A         | FDD            | N/A                  |
|                                                          | n78     | N/A                        | 10                   | N/A                    | 3490                       | 4.6         | TDD            | IMD5 <sup>3</sup>    |
|                                                          | n79     | 4670                       | 40                   | 216                    | 4670                       | N/A         | TDD            | N/A                  |
|                                                          | n1      | N/A                        | 5                    | N/A                    | 2140                       | 15.6        | FDD            | IMD3 <sup>1,2</sup>  |
|                                                          | n78     | 3400                       | 10                   | 50                     | 3400                       | N/A         | TDD            | N/A                  |

| Band / Channel bandwidth / N <sub>RB</sub> / Duplex mode |         |                            |                      |                        |                            |             |                | Source of<br>IMD    |
|----------------------------------------------------------|---------|----------------------------|----------------------|------------------------|----------------------------|-------------|----------------|---------------------|
| NR CA band<br>combination                                | NR band | UL F <sub>c</sub><br>(MHz) | UL/DL<br>BW<br>(MHz) | UL<br>L <sub>CRB</sub> | DL F <sub>c</sub><br>(MHz) | MSD<br>(dB) | Duplex<br>mode |                     |
|                                                          | n79     | 4660                       | 40                   | 216                    | 4660                       | N/A         | TDD            | N/A                 |
| CA_n2-n5-n30                                             | n2      | 1870                       | 5                    | 25                     | 1959                       | N/A         | FDD            | N/A                 |
|                                                          | n5      | N/A                        | 5                    | N/A                    | 880                        | 9.7         | FDD            | IMD4                |
|                                                          | n30     | 2310                       | 10                   | 50                     | 2355                       | N/A         | FDD            | N/A                 |
| CA_n2-n5-n48                                             | n2      | N/A                        | 5                    | N/A                    | 1962                       | 15.6        | FDD            | IMD3                |
|                                                          | n5      | 839                        | 5                    | 25                     | 884                        | N/A         | FDD            | N/A                 |
|                                                          | n48     | 3640                       | 10                   | 50                     | 3640                       | N/A         | TDD            | N/A                 |
|                                                          | n2      | 1905                       | 5                    | 25                     | 1985                       | N/A         | FDD            | N/A                 |
|                                                          | n5      | 844                        | 5                    | 25                     | 889                        | N/A         | FDD            | N/A                 |
|                                                          | n48     | N/A                        | 10                   | 50                     | 3593                       | 16.6        | TDD            | IMD3                |
|                                                          |         |                            |                      |                        |                            |             |                |                     |
| CA_n2-n5-n66                                             | n2      | 1900                       | 5                    | 25                     | 1980                       | N/A         | FDD            | N/A                 |
|                                                          | n5      | 830                        | 5                    | 25                     | 875                        | N/A         | FDD            | N/A                 |
|                                                          | n66     | N/A                        | 5                    | N/A                    | 2140                       | 7.2         | FDD            | IMD4                |
| CA_n2-n5-n77                                             | n2      | 1907.5                     | 5                    | 25                     | 1987.5                     | N/A         | FDD            | N/A                 |
|                                                          | n5      | N/A                        | 5                    | N/A                    | 887.5                      | 3.8         | FDD            | IMD5 <sup>5</sup>   |
|                                                          | n77     | 3305                       | 10                   | 50                     | 3305                       | N/A         | TDD            | N/A                 |
|                                                          | n2      | N/A                        | 5                    | N/A                    | 1987                       | 16.5        | FDD            | IMD3 <sup>5</sup>   |
|                                                          | n5      | 846.5                      | 5                    | 25                     | 891.5                      | N/A         | FDD            | N/A                 |
|                                                          | n77     | 3680                       | 10                   | 50                     | 3680                       | N/A         | TDD            | N/A                 |
|                                                          | n2      | 1880                       | 5                    | 25                     | 1960                       | N/A         | FDD            | N/A                 |
|                                                          | n5      | 830                        | 5                    | 25                     | 875                        | N/A         | FDD            | N/A                 |
|                                                          | n77     | N/A                        | 10                   | N/A                    | 3540                       | 16.0        | TDD            | IMD3 <sup>1</sup>   |
| CA_n2-n12-n30                                            | n2      | 1885                       | 5                    | 25                     | 1965                       | N/A         | FDD            | N/A                 |
|                                                          | n12     | 708.5                      | 5                    | 25                     | 738.5                      | N/A         | FDD            | N/A                 |
|                                                          | n30     | N/A                        | 5                    | N/A                    | 2353                       | 12.0        | FDD            | IMD4                |
| CA_n2-n12-n77 <sup>5</sup>                               | n2      | N/A                        | 5                    | N/A                    | 1960                       | 16.5        | FDD            | IMD3 <sup>2</sup>   |
|                                                          | n12     | 707.5                      | 5                    | 25                     | 737.5                      | N/A         | FDD            | N/A                 |
|                                                          | n77     | 3375                       | 10                   | 50                     | 3375                       | N/A         | TDD            | N/A                 |
|                                                          | n2      | 1900                       | 5                    | 25                     | 1980                       | N/A         | FDD            | N/A                 |
|                                                          | n12     | 707.5                      | 5                    | 25                     | 737.5                      | N/A         | FDD            | N/A                 |
|                                                          | n77     | N/A                        | 10                   | N/A                    | 3315                       | 16.0        | TDD            | IMD3 <sup>1,2</sup> |
| CA_n2-n14-n66                                            | n2      | 1874                       | 5                    | 25                     | 1954                       | N/A         | FDD            | N/A                 |
|                                                          | n14     | 793                        | 5                    | 25                     | 763                        | N/A         | FDD            | N/A                 |
|                                                          | n66     | N/A                        | 5                    | N/A                    | 2162                       | 7.6         | FDD            | IMD4                |
|                                                          | n2      | N/A                        | 5                    | N/A                    | 1954                       | 7.2         | FDD            | IMD4                |
|                                                          | n14     | 793                        | 5                    | 25                     | 763                        | N/A         | FDD            | N/A                 |
|                                                          | n66     | 1770                       | 5                    | 25                     | 2170                       | N/A         | FDD            | N/A                 |
| CA_n2-n14-n77                                            | n2      | N/A                        | 5                    | N/A                    | 1954                       | 16.5        | FDD            | IMD3                |
|                                                          | n14     | 793                        | 5                    | 25                     | 763                        | N/A         | FDD            | N/A                 |
|                                                          | n77     | 3540                       | 10                   | 50                     | 3540                       | N/A         | TDD            | N/A                 |
|                                                          | n2      | 1880                       | 5                    | 25                     | 1960                       | N/A         | FDD            | N/A                 |
|                                                          | n14     | 793                        | 5                    | 25                     | 763                        | N/A         | FDD            | N/A                 |
| CA_n2-n30-n77                                            | n77     | N/A                        | 10                   | N/A                    | 3466                       | 16.0        | TDD            | IMD3 <sup>1</sup>   |
|                                                          | n2      | N/A                        | 5                    | N/A                    | 1986                       | 8.6         | FDD            | IMD4 <sup>5</sup>   |
|                                                          | n30     | 2312                       | 5                    | 25                     | 2357                       | N/A         | FDD            | N/A                 |
|                                                          | n77     | 3305                       | 10                   | 50                     | 3305                       | N/A         | TDD            | N/A                 |
|                                                          | n2      | 1905                       | 5                    | 25                     | 1985                       | N/A         | FDD            | N/A                 |
|                                                          | n30     | N/A                        | 5                    | N/A                    | 2354                       | 10.6        | FDD            | IMD4 <sup>5</sup>   |
|                                                          | n77     | 3361                       | 10                   | 50                     | 3361                       | N/A         | TDD            | N/A                 |
|                                                          | n2      | 1860                       | 5                    | 25                     | 1940                       | N/A         | FDD            | N/A                 |
|                                                          | n30     | N/A                        | 5                    | N/A                    | 2354                       | 3.4         | FDD            | IMD5                |
|                                                          | n77     | 3967                       | 10                   | 50                     | 3967                       | N/A         | TDD            | N/A                 |
|                                                          | n2      | 1870                       | 5                    | 25                     | 1950                       | N/A         | FDD            | N/A                 |
|                                                          | n30     | 2310                       | 5                    | 25                     | 2355                       | N/A         | FDD            | N/A                 |
| CA_n2-n48-n66                                            | n77     | N/A                        | 10                   | N/A                    | 4180                       | 29.4        | TDD            | IMD2 <sup>2,5</sup> |
|                                                          | n2      | 1855                       | 5                    | 25                     | 1935                       | N/A         | FDD            | N/A                 |
|                                                          | n48     | N/A                        | 10                   | 50                     | 3625                       | 32.0        | TDD            | IMD2                |
|                                                          | n66     | 1770                       | 5                    | 25                     | 2190                       | N/A         | FDD            | N/A                 |
|                                                          | n2      | 1905                       | 5                    | 25                     | 1985                       | N/A         | FDD            | N/A                 |
|                                                          | n48     | 3560                       | 10                   | 50                     | 3560                       | N/A         | TDD            | N/A                 |

| Band / Channel bandwidth / N <sub>RB</sub> / Duplex mode |         |                         |                |                     |                         |          |             | Source of IMD     |
|----------------------------------------------------------|---------|-------------------------|----------------|---------------------|-------------------------|----------|-------------|-------------------|
| NR CA band combination                                   | NR band | UL F <sub>c</sub> (MHz) | UL/DL BW (MHz) | UL L <sub>CRB</sub> | DL F <sub>c</sub> (MHz) | MSD (dB) | Duplex mode |                   |
|                                                          | n66     | N/A                     | 5              | N/A                 | 2155                    | 12.1     | FDD         | IMD4              |
|                                                          | n2      | N/A                     | 5              | N/A                 | 1960                    | 28.3     | FDD         | IMD2 <sup>1</sup> |
|                                                          | n48     | 3695                    | 10             | 50                  | 3695                    | N/A      | TDD         | N/A               |
| CA_n2-n66-n77                                            | n66     | 1735                    | 5              | 25                  | 2135                    | N/A      | FDD         | N/A               |
|                                                          | n2      | 1880                    | 5              | 25                  | 1960                    | N/A      | FDD         | N/A               |
|                                                          | n66     | 1740                    | 5              | 25                  | 2140                    | N/A      | FDD         | N/A               |
|                                                          | n77     | N/A                     | 10             | N/A                 | 3620                    | 29.4     | TDD         | IMD2 <sup>5</sup> |
|                                                          | n2      | 1880                    | 5              | 25                  | 1960                    | N/A      | FDD         | N/A               |
|                                                          | n66     | 1740                    | 5              | 25                  | 2140                    | N/A      | FDD         | N/A               |
|                                                          | n77     | N/A                     | 10             | N/A                 | 3900                    | 8.9      | TDD         | IMD4              |
|                                                          | n2      | 1855                    | 5              | 25                  | 1935                    | N/A      | FDD         | N/A               |
|                                                          | n66     | N/A                     | 5              | N/A                 | 2115                    | 29.2     | FDD         | IMD2              |
|                                                          | n77     | 3970                    | 10             | 50                  | 3970                    | N/A      | TDD         | N/A               |
|                                                          | n2      | 1880                    | 5              | 25                  | 1960                    | N/A      | FDD         | N/A               |
|                                                          | n66     | N/A                     | 5              | N/A                 | 2140                    | 10.4     | FDD         | IMD4              |
|                                                          | n77     | 3500                    | 10             | 50                  | 3500                    | N/A      | TDD         | N/A               |
|                                                          | n2      | 1885                    | 5              | 25                  | 1965                    | N/A      | FDD         | N/A               |
|                                                          | n66     | N/A                     | 5              | N/A                 | 2175                    | 4.0      | FDD         | IMD5              |
|                                                          | n77     | 3915                    | 10             | 50                  | 3915                    | N/A      | TDD         | N/A               |
|                                                          | n2      | N/A                     | 5              | N/A                 | 1960                    | 32.1     | FDD         | IMD2              |
|                                                          | n66     | 1760                    | 5              | 25                  | 2160                    | N/A      | FDD         | N/A               |
|                                                          | n77     | 3720                    | 10             | 50                  | 3720                    | N/A      | TDD         | N/A               |
|                                                          | n2      | N/A                     | 5              | N/A                 | 1960                    | 9.1      | FDD         | IMD4 <sup>5</sup> |
|                                                          | n66     | 1770                    | 5              | 25                  | 2170                    | N/A      | FDD         | N/A               |
|                                                          | n77     | 3350                    | 10             | 50                  | 3350                    | N/A      | TDD         | N/A               |
|                                                          | n2      | N/A                     | 5              | N/A                 | 1960                    | 2.1      | FDD         | IMD5 <sup>5</sup> |
|                                                          | n66     | 1760                    | 5              | 25                  | 2160                    | N/A      | FDD         | N/A               |
|                                                          | n77     | 3620                    | 10             | 50                  | 3620                    | N/A      | TDD         | N/A               |
| CA_n3-n5-n7                                              | n3      | 1780                    | 5              | 25                  | 1875                    | N/A      | FDD         | N/A               |
|                                                          | n5      | 845                     | 5              | 25                  | 890                     | N/A      | FDD         | N/A               |
|                                                          | n7      | N/A                     | 10             | N/A                 | 2625                    | 30.0     | FDD         | IMD2 <sup>4</sup> |
|                                                          | n3      | 1720                    | 5              | 25                  | 1815                    | N/A      | FDD         | N/A               |
|                                                          | n5      | N/A                     | 5              | N/A                 | 880                     | 19.0     | FDD         | IMD3              |
| CA_n3-n5-n78                                             | n7      | 2560                    | 10             | 50                  | 2680                    | N/A      | FDD         | N/A               |
|                                                          | n3      | 1730                    | 5              | 25                  | 1825                    | N/A      | FDD         | N/A               |
|                                                          | n5      | 839                     | 5              | 25                  | 884                     | N/A      | FDD         | N/A               |
|                                                          | n78     | N/A                     | 10             | N/A                 | 3408                    | 16.1     | TDD         | IMD3              |
|                                                          | n3      | 1730                    | 5              | 25                  | 1825                    | N/A      | FDD         | N/A               |
|                                                          | n5      | 839                     | 5              | 25                  | 884                     | N/A      | FDD         | N/A               |
|                                                          | n78     | N/A                     | 10             | N/A                 | 3512                    | 4.5      | TDD         | IMD5              |
|                                                          | n3      | N/A                     | 5              | N/A                 | 1862                    | 15.7     | FDD         | IMD3              |
| CA_n3-n7-n28                                             | n5      | 839                     | 5              | 25                  | 884                     | N/A      | FDD         | N/A               |
|                                                          | n78     | 3540                    | 10             | 50                  | 3540                    | N/A      | TDD         | N/A               |
|                                                          | n3      | 1747                    | 5              | 25                  | 1842                    | N/A      | FDD         | N/A               |
|                                                          | n7      | 2543                    | 5              | 25                  | 2663                    | N/A      | FDD         | N/A               |
|                                                          | n28     | N/A                     | 5              | N/A                 | 796                     | 20.0     | FDD         | IMD2              |
|                                                          | n3      | 1712.5                  | 5              | 25                  | 1807.5                  | N/A      | FDD         | N/A               |
|                                                          | n7      | N/A                     | 5              | N/A                 | 2682                    | 17.0     | FDD         | IMD3              |
|                                                          | n28     | 743                     | 5              | 25                  | 798                     | N/A      | FDD         | N/A               |
| CA_n3-n7-n78                                             | n3      | N/A                     | 5              | N/A                 | 1832.5                  | 16.5     | FDD         | IMD2              |
|                                                          | n7      | 2543                    | 5              | 25                  | 2663                    | N/A      | FDD         | N/A               |
|                                                          | n28     | 710.5                   | 5              | 25                  | 765.5                   | N/A      | FDD         | N/A               |
|                                                          | n3      | N/A                     | 5              | N/A                 | 1820                    | 17.6     | FDD         | IMD3              |
|                                                          | n7      | 2565                    | 5              | 25                  | 2685                    | N/A      | FDD         | N/A               |
|                                                          | n78     | 3310                    | 10             | 50                  | 3310                    | N/A      | TDD         | N/A               |
|                                                          | n3      | N/A                     | 5              | N/A                 | 1820                    | 8.6      | FDD         | IMD4              |
|                                                          | n7      | 2565                    | 5              | 25                  | 2685                    | N/A      | FDD         | N/A               |
|                                                          | n78     | 3475                    | 10             | 50                  | 3475                    | N/A      | TDD         | N/A               |
|                                                          | n3      | 1730                    | 5              | 25                  | 1825                    | N/A      | FDD         | N/A               |
|                                                          | n7      | 2560                    | 5              | 25                  | 2680                    | N/A      | FDD         | N/A               |

| Band / Channel bandwidth / N <sub>RB</sub> / Duplex mode |         |                         |                |                     |                         |          |             | Source of IMD       |
|----------------------------------------------------------|---------|-------------------------|----------------|---------------------|-------------------------|----------|-------------|---------------------|
| NR CA band combination                                   | NR band | UL F <sub>c</sub> (MHz) | UL/DL BW (MHz) | UL L <sub>CRB</sub> | DL F <sub>c</sub> (MHz) | MSD (dB) | Duplex mode |                     |
|                                                          | n78     | N/A                     | 10             | N/A                 | 3390                    | 16.1     | TDD         | IMD3                |
| CA_n3-n8-n78                                             | n3      | 1730                    | 5              | 25                  | 1825                    | N/A      | FDD         | N/A                 |
|                                                          | n8      | 910                     | 5              | 25                  | 955                     | N/A      | FDD         | N/A                 |
|                                                          | n78     | N/A                     | 10             | N/A                 | 3550                    | 16.1     | TDD         | IMD3                |
|                                                          | n3      | 1730                    | 5              | 25                  | 1825                    | N/A      | FDD         | N/A                 |
|                                                          | n8      | 910                     | 5              | 25                  | 955                     | N/A      | FDD         | N/A                 |
|                                                          | n78     | N/A                     | 10             | N/A                 | 3370                    | 4.5      | TDD         | IMD5                |
|                                                          | n3      | N/A                     | 5              | N/A                 | 1820                    | 15.7     | FDD         | IMD3                |
|                                                          | n8      | 910                     | 5              | 25                  | 955                     | N/A      | FDD         | N/A                 |
| CA_n3-n18-n28                                            | n78     | 3640                    | 10             | 50                  | 3640                    | N/A      | TDD         | N/A                 |
|                                                          | n3      | 1712.5                  | 5              | 25                  | 1807.5                  | N/A      | FDD         | N/A                 |
|                                                          | n28     | N/A                     | 5              | N/A                 | 770                     | 9.4      | FDD         | IMD4                |
| CA_n3-n18-n41                                            | n18     | 827.5                   | 5              | 25                  | 872.5                   | N/A      | FDD         | N/A                 |
|                                                          | n18     | 820                     | 5              | 25                  | 865                     | N/A      | FDD         | N/A                 |
|                                                          | n3      | 1720                    | 5              | 25                  | 1815                    | N/A      | FDD         | N/A                 |
|                                                          | n41     | N/A                     | 10             | N/A                 | 2540                    | N/A      | TDD         | IMD2                |
|                                                          | n18     | 820                     | 5              | 25                  | 865                     | N/A      | FDD         | N/A                 |
|                                                          | n3      | 1725                    | 5              | 25                  | 1820                    | N/A      | FDD         | N/A                 |
|                                                          | n41     | N/A                     | 10             | N/A                 | 2630                    | 16.0     | TDD         | IMD3                |
|                                                          | n18     | N/A                     | 5              | N/A                 | 865                     | 28.9     | FDD         | IMD2                |
|                                                          | n3      | 1765                    | 5              | 25                  | 1860                    | N/A      | FDD         | N/A                 |
|                                                          | n41     | 2630                    | 10             | 50                  | 2630                    | N/A      | TDD         | N/A                 |
|                                                          | n18     | N/A                     | 5              | N/A                 | 875                     | 19.0     | FDD         | IMD3                |
|                                                          | n3      | 1725                    | 5              | 25                  | 1820                    | N/A      | FDD         | N/A                 |
|                                                          | n41     | 2670                    | 5              | 25                  | 2670                    | N/A      | TDD         | N/A                 |
|                                                          | n3      | N/A                     | 5              | N/A                 | 1850                    | 28.8     | FDD         | IMD2                |
|                                                          | n41     | 2670                    | 10             | 50                  | 2670                    | N/A      | TDD         | N/A                 |
|                                                          | n18     | 820                     | 5              | 25                  | 865                     | N/A      | FDD         | N/A                 |
| CA_n3-n18-n77                                            | n18     | 820                     | 5              | 25                  | 865                     | N/A      | FDD         | N/A                 |
|                                                          | n3      | 1770                    | 5              | 25                  | 1865                    | N/A      | FDD         | N/A                 |
|                                                          | n77     | N/A                     | 10             | N/A                 | 3410                    | 16.3     | TDD         | IMD3 <sup>1,2</sup> |
|                                                          | n18     | 820                     | 5              | 25                  | 865                     | N/A      | FDD         | N/A                 |
|                                                          | n3      | N/A                     | 5              | N/A                 | 1865                    | 15.7     | FDD         | IMD3                |
|                                                          | n77     | 3505                    | 10             | 50                  | 3505                    | N/A      | TDD         | N/A                 |
| CA_n3-n20-n67                                            | n3      | 1775                    | 5              | 25                  | 1870                    | N/A      | FDD         | N/A                 |
|                                                          | n20     | 840                     | 5              | 25                  | 799                     | N/A      | FDD         | N/A                 |
|                                                          | n67     | N/A                     | 5              | N/A                 | 745                     | 9.4      | FDD         | IMD4                |
| CA_n3-n28-n41                                            | n3      | 1715                    | 5              | 25                  | 1810                    | N/A      | FDD         | N/A                 |
|                                                          | n28     | 743                     | 5              | 25                  | 798                     | N/A      | FDD         | N/A                 |
|                                                          | n41     | N/A                     | 5              | N/A                 | 2518                    | 27.4     | TDD         | IMD2                |
|                                                          | n3      | 1715                    | 5              | 25                  | 1810                    | N/A      | FDD         | N/A                 |
|                                                          | n28     | 743                     | 5              | 25                  | 798                     | N/A      | FDD         | N/A                 |
|                                                          | n41     | N/A                     | 5              | N/A                 | 2687                    | 15.9     | TDD         | IMD3                |
|                                                          | n3      | 1720                    | 5              | 25                  | 1815                    | N/A      | FDD         | N/A                 |
|                                                          | n41     | 2510                    | 5              | 25                  | 2510                    | N/A      | TDD         | N/A                 |
|                                                          | n28     | N/A                     | 5              | N/A                 | 790                     | 26.0     | FDD         | IMD2 <sup>4</sup>   |
|                                                          | n28     | 710.5                   | 5              | 25                  | 765.5                   | N/A      | FDD         | N/A                 |
|                                                          | n41     | 2543                    | 10             | 50                  | 2543                    | N/A      | TDD         | N/A                 |
|                                                          | n3      | N/A                     | 5              | N/A                 | 1832.5                  | 26.0     | FDD         | IMD2                |
| CA_n3-n28-n77                                            | n3      | 1720                    | 5              | 25                  | 1815                    | N/A      | FDD         | N/A                 |
|                                                          | n28     | 733                     | 5              | 25                  | 788                     | N/A      | FDD         | N/A                 |
|                                                          | n77     | N/A                     | 10             | N/A                 | 4173                    | 15.9     | TDD         | IMD3                |
|                                                          | n28     | 735                     | 5              | 25                  | 790                     | N/A      | FDD         | N/A                 |
|                                                          | n77     | 3320                    | 10             | 50                  | 3320                    | N/A      | TDD         | N/A                 |
|                                                          | n3      | N/A                     | 5              | N/A                 | 1850                    | 17.0     | FDD         | IMD3                |
|                                                          | n3      | 1712.5                  | 5              | 25                  | 1807.5                  | N/A      | FDD         | N/A                 |
|                                                          | n77     | 4195                    | 10             | 50                  | 4195                    | N/A      | TDD         | N/A                 |
| CA_n3-n28-n78                                            | n28     | N/A                     | 5              | N/A                 | 770                     | 15.3     | FDD         | IMD3                |
|                                                          | n28     | 735                     | 5              | 25                  | 790                     | N/A      | FDD         | N/A                 |



| Band / Channel bandwidth / N <sub>RB</sub> / Duplex mode |         |                            |                      |                        |                            |             |                | Source of<br>IMD     |
|----------------------------------------------------------|---------|----------------------------|----------------------|------------------------|----------------------------|-------------|----------------|----------------------|
| NR CA band<br>combination                                | NR band | UL F <sub>c</sub><br>(MHz) | UL/DL<br>BW<br>(MHz) | UL<br>L <sub>CRB</sub> | DL F <sub>c</sub><br>(MHz) | MSD<br>(dB) | Duplex<br>mode |                      |
|                                                          | n78     | N/A                        | 10                   | N/A                    | 3320                       | 17.3        | TDD            | IMD3                 |
|                                                          | n3      | 1755                       | 5                    | 25                     | 1850                       | N/A         | FDD            | N/A                  |
|                                                          | n3      | 1750                       | 5                    | 25                     | 1845                       | N/A         | FDD            | N/A                  |
|                                                          | n28     | 743                        | 5                    | 25                     | 798                        | N/A         | FDD            | N/A                  |
|                                                          | n78     | N/A                        | 10                   | N/A                    | 3764                       | 4.5         | TDD            | IMD5                 |
| CA_n3-n28-n79                                            | n3      | 1770                       | 5                    | 25                     | 1865                       | N/A         | FDD            | N/A                  |
|                                                          | n28     | 725                        | 5                    | 25                     | 780                        | N/A         | FDD            | N/A                  |
|                                                          | n79     | N/A                        | 40                   | N/A                    | 4585                       | 9.4         | TDD            | IMD4 <sup>1</sup>    |
|                                                          | n3      | 1770                       | 5                    | 25                     | 1865                       | N/A         | FDD            | N/A                  |
|                                                          | n79     | 4530                       | 40                   | 216                    | 4530                       | N/A         | TDD            | N/A                  |
|                                                          | n28     | N/A                        | 5                    | N/A                    | 780                        | 10.3        | FDD            | IMD4                 |
|                                                          | n28     | 725                        | 5                    | 25                     | 780                        | N/A         | FDD            | N/A                  |
|                                                          | n79     | 4770                       | 40                   | 216                    | 4770                       | N/A         | TDD            | N/A                  |
|                                                          | n3      | N/A                        | 5                    | N/A                    | 1870                       | 5.7         | FDD            | IMD5                 |
|                                                          | n3      | N/A                        | 5                    | N/A                    | 1842.5                     | 1.0         | FDD            | IMD5                 |
|                                                          | n40     | 2347.5                     | 5                    | 25                     | 2347.5                     | N/A         | TDD            | N/A                  |
|                                                          | n41     | 2600                       | 10                   | 50                     | 2600                       | N/A         | TDD            | N/A                  |
| CA_n3-n41-n77                                            | n3      | 1720                       | 5                    | 25                     | 1815                       | N/A         | FDD            | N/A                  |
|                                                          | n77     | 3900                       | 10                   | 50                     | 3900                       | N/A         | TDD            | N/A                  |
|                                                          | n41     | N/A                        | 5                    | N/A                    | 2640                       | 5.3         | TDD            | IMD5                 |
|                                                          | n41     | 2620                       | 5                    | 25                     | 2620                       | N/A         | TDD            | N/A                  |
|                                                          | n77     | 3400                       | 10                   | 50                     | 3400                       | N/A         | TDD            | N/A                  |
|                                                          | n3      | N/A                        | 5                    | N/A                    | 1840                       | 16.4        | FDD            | IMD3                 |
|                                                          | n41     | 2580                       | 5                    | 25                     | 2580                       | N/A         | TDD            | N/A                  |
|                                                          | n3      | 1720                       | 5                    | 25                     | 1815                       | N/A         | FDD            | N/A                  |
|                                                          | n77     | N/A                        | 10                   | N/A                    | 3440                       | 16.8        | TDD            | IMD3 <sup>1</sup>    |
| CA_n3-n41-n78                                            | n3      | 1730                       | 5                    | 25                     | 1825                       | N/A         | FDD            | N/A                  |
|                                                          | n41     | 2560                       | 10                   | 50                     | 2560                       | N/A         | TDD            | N/A                  |
|                                                          | n78     | N/A                        | 10                   | N/A                    | 3390                       | 16.4        | TDD            | IMD3                 |
|                                                          | n3      | N/A                        | 5                    | N/A                    | 1840                       | 16.4        | TDD            | IMD3                 |
|                                                          | n41     | 2620                       | 5                    | 25                     | 2620                       | N/A         | FDD            | N/A                  |
|                                                          | n78     | 3400                       | 10                   | 50                     | 3400                       | N/A         | TDD            | N/A                  |
| CA_n3-n77-n79                                            | n77     | 3350                       | 10                   | 50                     | 3350                       | N/A         | FDD            | N/A                  |
|                                                          | n79     | 4840                       | 40                   | 216                    | 4840                       | N/A         | TDD            | N/A                  |
|                                                          | n3      | N/A                        | 5                    | N/A                    | 1860                       | 15.7        | TDD            | IMD3 <sup>1, 2</sup> |
| CA_n5-n7-n78                                             | n5      | N/A                        | 5                    | N/A                    | 879                        | 30.2        | FDD            | IMD2                 |
|                                                          | n7      | 2550                       | 5                    | 25                     | 2670                       | N/A         | FDD            | N/A                  |
|                                                          | n78     | 3429                       | 10                   | 50                     | 3429                       | N/A         | TDD            | N/A                  |
|                                                          | n5      | N/A                        | 5                    | N/A                    | 875                        | 3.3         | FDD            | IMD5                 |
|                                                          | n7      | 2525                       | 5                    | 25                     | 2645                       | N/A         | FDD            | N/A                  |
|                                                          | n78     | 3350                       | 10                   | 50                     | 3350                       | N/A         | TDD            | N/A                  |
|                                                          | n5      | 844                        | 5                    | 25                     | 889                        | N/A         | FDD            | N/A                  |
|                                                          | n7      | N/A                        | 5                    | N/A                    | 2645                       | 30.1        | FDD            | IMD2                 |
|                                                          | n78     | 3489                       | 10                   | 50                     | 3489                       | N/A         | TDD            | N/A                  |
|                                                          | n5      | 835                        | 5                    | 25                     | 880                        | N/A         | FDD            | N/A                  |
|                                                          | n7      | 2540                       | 5                    | 25                     | 2660                       | N/A         | FDD            | N/A                  |
|                                                          | n78     | N/A                        | 10                   | N/A                    | 3375                       | 29.7        | TDD            | IMD2                 |
|                                                          | n5      | 835                        | 5                    | 25                     | 880                        | N/A         | FDD            | N/A                  |
|                                                          | n7      | 2550                       | 5                    | 25                     | 2670                       | N/A         | FDD            | N/A                  |
|                                                          | n78     | N/A                        | 10                   | N/A                    | 3430                       | 9.7         | TDD            | IMD4                 |
| CA_n5-n12-n77                                            | n5      | N/A                        | 5                    | N/A                    | 880                        | 3.9         | FDD            | IMD5                 |
|                                                          | n12     | 707.5                      | 5                    | 25                     | 737.5                      | N/A         | FDD            | N/A                  |
|                                                          | n77     | 3710                       | 10                   | 50                     | 3710                       | N/A         | TDD            | N/A                  |
|                                                          | n5      | 835                        | 5                    | 25                     | 880                        | N/A         | FDD            | N/A                  |
|                                                          | n12     | N/A                        | 5                    | N/A                    | 740                        | 4.4         | FDD            | IMD5 <sup>5</sup>    |
|                                                          | n77     | 4080                       | 10                   | 50                     | 4080                       | N/A         | TDD            | N/A                  |
|                                                          | n5      | 830                        | 5                    | 25                     | 875                        | N/A         | FDD            | N/A                  |
|                                                          | n12     | 707.5                      | 5                    | 25                     | 737.5                      | N/A         | FDD            | N/A                  |
| CA_n5-n14-n77 <sup>5</sup>                               | n77     | N/A                        | 10                   | N/A                    | 3905                       | 4.4         | TDD            | IMD5                 |
| CA_n5-n14-n77 <sup>5</sup>                               | n5      | N/A                        | 5                    | N/A                    | 880                        | 3.9         | FDD            | IMD5                 |

| Band / Channel bandwidth / N <sub>RB</sub> / Duplex mode |         |                         |                |                     |                         |          |             | Source of IMD     |
|----------------------------------------------------------|---------|-------------------------|----------------|---------------------|-------------------------|----------|-------------|-------------------|
| NR CA band combination                                   | NR band | UL F <sub>c</sub> (MHz) | UL/DL BW (MHz) | UL L <sub>CRB</sub> | DL F <sub>c</sub> (MHz) | MSD (dB) | Duplex mode |                   |
|                                                          | n14     | 793                     | 5              | 25                  | 763                     | N/A      | FDD         | N/A               |
|                                                          | n77     | 4052                    | 10             | 50                  | 4052                    | N/A      | TDD         | N/A               |
|                                                          | n5      | 846.5                   | 5              | 25                  | 891.5                   | N/A      | FDD         | N/A               |
|                                                          | n14     | N/A                     | 5              | N/A                 | 765.5                   | 11.6     | FDD         | IMD4 <sup>1</sup> |
|                                                          | n77     | 3305                    | 10             | 50                  | 3305                    | N/A      | TDD         | N/A               |
|                                                          | n5      | 840                     | 5              | 25                  | 885                     | N/A      | FDD         | N/A               |
|                                                          | n14     | 793                     | 5              | 25                  | 763                     | N/A      | FDD         | N/A               |
|                                                          | n77     | N/A                     | 10             | N/A                 | 3313                    | 10.3     | TDD         | IMD4 <sup>1</sup> |
| CA_n5-n25-n66                                            | n5      | 834                     | 5              | 25                  | 879                     | N/A      | FDD         | N/A               |
|                                                          | n25     | 1900                    | 5              | 25                  | 1980                    | N/A      | FDD         | N/A               |
|                                                          | n66     | N/A                     | 5              | N/A                 | 2132                    | 7.2      | FDD         | IMD4              |
| CA_n5-n25-n77                                            | n5      | 830                     | 5              | 25                  | 875                     | N/A      | FDD         | N/A               |
|                                                          | n25     | 1880                    | 5              | 25                  | 1960                    | N/A      | FDD         | N/A               |
|                                                          | n77     | 3540                    | 10             | N/A                 | 3540                    | 16.0     | TDD         | IMD3              |
|                                                          | n5      | N/A                     | 5              | N/A                 | 889                     | 3.8      | FDD         | IMD5 <sup>5</sup> |
|                                                          | n25     | 1907                    | 5              | 25                  | 1987                    | N/A      | FDD         | N/A               |
|                                                          | n77     | 3305                    | 10             | 50                  | 3305                    | N/A      | TDD         | N/A               |
|                                                          | n5      | N/A                     | 5              | N/A                 | 891.5                   | N/A      | FDD         | N/A               |
|                                                          | n25     | 1907                    | 5              | 25                  | 1987                    | 16.5     | FDD         | IMD3              |
|                                                          | n77     | 3680                    | 10             | 25                  | 3680                    | N/A      | TDD         | N/A               |
| CA_n5-n25-n78                                            | n5      | 830                     | 5              | 25                  | 875                     | N/A      | FDD         | N/A               |
|                                                          | n25     | 1900                    | 5              | 25                  | 1980                    | N/A      | FDD         | N/A               |
|                                                          | n78     | N/A                     | 10             | N/A                 | 3560                    | 16.1     | TDD         | IMD3              |
| CA_n5-n29-n77                                            | n5      | 845                     | 5              | 25                  | 890                     | N/A      | FDD         | N/A               |
|                                                          | n29     | N/A                     | 5              | N/A                 | 720                     | 4.4      | SDL         | IMD5 <sup>7</sup> |
|                                                          | n77     | 4100                    | 10             | 50                  | 4100                    | N/A      | TDD         | N/A               |
| CA_n5-n30-n66                                            | n5      | 830                     | 5              | 25                  | 875                     | N/A      | FDD         | N/A               |
|                                                          | n30     | 2307.5                  | 5              | 25                  | 2352.5                  | N/A      | FDD         | N/A               |
|                                                          | n66     | N/A                     | 5              | N/A                 | 2125                    | 4        | FDD         | IMD5              |
| CA_n5-n30-n77                                            | n5      | N/A                     | 5              | N/A                 | 880                     | 15.2     | FDD         | IMD3 <sup>1</sup> |
|                                                          | n30     | 2310                    | 5              | 25                  | 2355                    | N/A      | FDD         | N/A               |
|                                                          | n77     | 3740                    | 10             | 50                  | 3740                    | N/A      | TDD         | N/A               |
|                                                          | n5      | 835                     | 5              | 25                  | 880                     | N/A      | FDD         | N/A               |
|                                                          | n30     | N/A                     | 5              | N/A                 | 2355                    | 13.2     | FDD         | IMD3 <sup>5</sup> |
|                                                          | n77     | 4025                    | 10             | 50                  | 4025                    | N/A      | TDD         | N/A               |
|                                                          | n5      | 840                     | 5              | 25                  | 885                     | N/A      | FDD         | N/A               |
|                                                          | n30     | 2310                    | 5              | 25                  | 2355                    | N/A      | FDD         | N/A               |
|                                                          | n77     | N/A                     | 10             | N/A                 | 3780                    | 16.1     | TDD         | IMD3              |
| CA_n5-n40-n78                                            | n5      | N/A                     | 5              | N/A                 | 880                     | 15.2     | FDD         | IMD3              |
|                                                          | n40     | 2310                    | 5              | 25                  | 2310                    | N/A      | TDD         | N/A               |
|                                                          | n78     | 3740                    | 10             | 50                  | 3740                    | N/A      | TDD         | N/A               |
|                                                          | n5      | 840                     | 5              | 25                  | 885                     | N/A      | FDD         | N/A               |
|                                                          | n40     | 2310                    | 5              | 25                  | 2310                    | N/A      | TDD         | N/A               |
| CA_n5-n48-n66                                            | n78     | N/A                     | 10             | N/A                 | 3780                    | 16.1     | TDD         | IMD3              |
|                                                          | n5      | 829                     | 5              | 25                  | 874                     | N/A      | FDD         | N/A               |
|                                                          | n48     | N/A                     | 10             | N/A                 | 3622                    | 3.6      | TDD         | IMD5              |
|                                                          | n66     | 1760                    | 5              | 25                  | 2160                    | N/A      | FDD         | N/A               |
| CA_n5-n66-n77                                            | n5      | 845                     | 5              | 25                  | 890                     | N/A      | FDD         | N/A               |
|                                                          | n66     | 1775                    | 5              | 25                  | 2175                    | N/A      | FDD         | N/A               |
|                                                          | n77     | N/A                     | 10             | N/A                 | 3465                    | 16.1     | TDD         | IMD3              |
|                                                          | n5      | 826.5                   | 5              | 25                  | 871.5                   | N/A      | FDD         | N/A               |
|                                                          | n66     | 1712.5                  | 5              | 25                  | 2112.5                  | N/A      | FDD         | N/A               |
|                                                          | n77     | N/A                     | 10             | N/A                 | 4192                    | 8.2      | TDD         | IMD4 <sup>5</sup> |
|                                                          | n5      | 835                     | 5              | 25                  | 880                     | N/A      | FDD         | N/A               |
|                                                          | n66     | 1735                    | 5              | 25                  | 2135                    | N/A      | FDD         | N/A               |
|                                                          | n77     | N/A                     | 10             | N/A                 | 3535                    | 3.3      | TDD         | IMD5              |
|                                                          | n5      | 826.5                   | 5              | 25                  | 871.5                   | N/A      | FDD         | N/A               |
|                                                          | n66     | N/A                     | 5              | N/A                 | 2142                    | 13.2     | FDD         | IMD3              |
|                                                          | n77     | 3795                    | 10             | 50                  | 3795                    | N/A      | TDD         | N/A               |
| CA_n5-n66-n78                                            | n5      | 830                     | 5              | 25                  | 875                     | N/A      | FDD         | N/A               |

| Band / Channel bandwidth / N <sub>RB</sub> / Duplex mode |         |                            |                      |                        |                            |             |                | Source of<br>IMD  |
|----------------------------------------------------------|---------|----------------------------|----------------------|------------------------|----------------------------|-------------|----------------|-------------------|
| NR CA band<br>combination                                | NR band | UL F <sub>c</sub><br>(MHz) | UL/DL<br>BW<br>(MHz) | UL<br>L <sub>CRB</sub> | DL F <sub>c</sub><br>(MHz) | MSD<br>(dB) | Duplex<br>mode |                   |
|                                                          | n66     | 1720                       | 5                    | 25                     | 2120                       | N/A         | FDD            | N/A               |
|                                                          | n78     | N/A                        | 10                   | N/A                    | 3380                       | 16.1        | TDD            | IMD3              |
| CA_n5-n66-n78                                            | n5      | 830                        | 5                    | 25                     | 875                        | N/A         | FDD            | N/A               |
|                                                          | n66     | N/A                        | 5                    | N/A                    | 2120                       | 13.2        | FDD            | IMD3              |
|                                                          | n78     | 3780                       | 10                   | 50                     | 3780                       | N/A         | TDD            | N/A               |
| CA_n7-n8-n40                                             | n7      | 2530                       | 5                    | 25                     | 2650                       | N/A         | FDD            | N/A               |
|                                                          | n8      | 905                        | 5                    | 25                     | 950                        | N/A         | FDD            | N/A               |
|                                                          | n40     | N/A                        | 5                    | N/A                    | 2345                       | 3.0         | TDD            | IMD5              |
| CA_n7-n8-n78                                             | n7      | 2555                       | 5                    | 25                     | 2675                       | N/A         | FDD            | N/A               |
|                                                          | n8      | 900                        | 5                    | 25                     | 945                        | N/A         | FDD            | N/A               |
|                                                          | n78     | N/A                        | 10                   | N/A                    | 3455                       | 28.5        | TDD            | IMD2 <sup>2</sup> |
|                                                          | n7      | 2555                       | 5                    | 25                     | 2675                       | N/A         | FDD            | N/A               |
|                                                          | n8      | N/A                        | 5                    | N/A                    | 945                        | 29.7        | FDD            | IMD2              |
|                                                          | n78     | 3500                       | 10                   | 50                     | 3500                       | N/A         | TDD            | N/A               |
|                                                          | n7      | 2520                       | 5                    | 25                     | 2640                       | N/A         | FDD            | N/A               |
|                                                          | n8      | N/A                        | 5                    | N/A                    | 940                        | 3.1         | FDD            | IMD5              |
|                                                          | n78     | 3310                       | 10                   | 50                     | 3310                       | N/A         | TDD            | N/A               |
|                                                          | n7      | N/A                        | 5                    | N/A                    | 2650                       | 28          | FDD            | IMD2              |
|                                                          | n8      | 895                        | 5                    | 25                     | 940                        | N/A         | FDD            | N/A               |
|                                                          | n78     | 3545                       | 10                   | 50                     | 3545                       | N/A         | TDD            | N/A               |
|                                                          | n7      | N/A                        | 5                    | N/A                    | 2640                       | 5.3         | FDD            | IMD5              |
|                                                          | n25     | 1870                       | 5                    | 25                     | 1950                       | N/A         | FDD            | N/A               |
|                                                          | n77     | 4125                       | 10                   | 50                     | 4125                       | N/A         | TDD            | N/A               |
| CA_n7-n25-n77                                            | n7      | 2550                       | 5                    | 25                     | 2670                       | N/A         | FDD            | N/A               |
|                                                          | n25     | N/A                        | 5                    | N/A                    | 1950                       | 8.6         | FDD            | IMD4              |
|                                                          | n77     | 3525                       | 10                   | 50                     | 3525                       | N/A         | TDD            | N/A               |
|                                                          | n7      | 2520                       | 5                    | 25                     | 2640                       | N/A         | FDD            | N/A               |
|                                                          | n25     | 1905                       | 5                    | 25                     | 1985                       | N/A         | FDD            | N/A               |
|                                                          | n77     | N/A                        | 10                   | N/A                    | 3750                       | 4.5         | TDD            | IMD5              |
|                                                          | n7      | 2550                       | 5                    | 25                     | 2670                       | N/A         | FDD            | N/A               |
|                                                          | n25     | N/A                        | 5                    | N/A                    | 1950                       | 8.6         | FDD            | IMD4              |
| CA_n7-n25-n78                                            | n78     | 3525                       | 10                   | 50                     | 3525                       | N/A         | TDD            | N/A               |
|                                                          | n7      | 2520                       | 5                    | 25                     | 2640                       | N/A         | FDD            | N/A               |
|                                                          | n25     | 1905                       | 5                    | 25                     | 1985                       | N/A         | FDD            | N/A               |
|                                                          | n78     | N/A                        | 10                   | N/A                    | 3750                       | 4.5         | TDD            | IMD5              |
|                                                          | n7      | 2567.5                     | 5                    | 25                     | 2687.5                     | N/A         | FDD            | N/A               |
|                                                          | n28     | N/A                        | 5                    | N/A                    | 782.5                      | 28.8        | FDD            | IMD2              |
| CA_n7-n28-n78                                            | n78     | 3350                       | 10                   | 50                     | 3350                       | N/A         | TDD            | N/A               |
|                                                          | n7      | 2567.5                     | 5                    | 25                     | 2687.5                     | N/A         | FDD            | N/A               |
|                                                          | n28     | N/A                        | 5                    | N/A                    | 782.5                      | 3.0         | FDD            | IMD5              |
|                                                          | n78     | 3460                       | 10                   | 50                     | 3460                       | N/A         | TDD            | N/A               |
|                                                          | n7      | N/A                        | 5                    | N/A                    | 2650                       | 30.5        | FDD            | IMD2              |
|                                                          | n28     | 740                        | 5                    | 25                     | 795                        | N/A         | FDD            | N/A               |
|                                                          | n78     | 3390                       | 10                   | 50                     | 3390                       | N/A         | TDD            | N/A               |
|                                                          | n7      | 2565                       | 5                    | 25                     | 2685                       | N/A         | FDD            | N/A               |
|                                                          | n28     | 745                        | 5                    | 25                     | 800                        | N/A         | FDD            | N/A               |
|                                                          | n78     | N/A                        | 10                   | N/A                    | 3310                       | 29.7        | TDD            | IMD2              |
|                                                          | n7      | 2550                       | 5                    | 25                     | 2670                       | N/A         | FDD            | N/A               |
|                                                          | n28     | 720                        | 5                    | 25                     | 775                        | N/A         | FDD            | N/A               |
|                                                          | n78     | 3714                       | 10                   | N/A                    | 3714                       | 9.7         | TDD            | IMD4              |
|                                                          | n7      | N/A                        | 5                    | N/A                    | 2630                       | 10.1        | FDD            | IMD4              |
|                                                          | n40     | 2310                       | 5                    | 25                     | 2310                       | N/A         | TDD            | N/A               |
| CA_n7-n40-n78                                            | n78     | 3625                       | 10                   | 50                     | 3625                       | N/A         | TDD            | N/A               |
|                                                          | n7      | 2510                       | 5                    | 25                     | 2630                       | N/A         | FDD            | N/A               |
|                                                          | n40     | N/A                        | 5                    | N/A                    | 2310                       | 8.7         | TDD            | IMD4              |
|                                                          | n78     | 3785                       | 10                   | 50                     | 3785                       | N/A         | TDD            | N/A               |
|                                                          | n7      | 2530                       | 5                    | 25                     | 2650                       | N/A         | FDD            | N/A               |
|                                                          | n46     | 5840                       | 20                   | 100                    | 5840                       | N/A         | TDD            | N/A               |
| CA_n7-n46-n78                                            | n78     | N/A                        | 10                   | N/A                    | 3310                       | 29,7        | TDD            | IMD2 <sup>1</sup> |
|                                                          | n7      | 2530                       | 5                    | 25                     | 2650                       | N/A         | FDD            | N/A               |

| Band / Channel bandwidth / N <sub>RB</sub> / Duplex mode |         |                         |                |                     |                         |          |             | Source of IMD         |
|----------------------------------------------------------|---------|-------------------------|----------------|---------------------|-------------------------|----------|-------------|-----------------------|
| NR CA band combination                                   | NR band | UL F <sub>c</sub> (MHz) | UL/DL BW (MHz) | UL L <sub>CRB</sub> | DL F <sub>c</sub> (MHz) | MSD (dB) | Duplex mode |                       |
|                                                          | n46     | N/A                     | 20             | N/A                 | 5840                    | 25.2     | TDD         | IMD2 <sup>1</sup>     |
|                                                          | n78     | 3310                    | 10             | 50                  | 3310                    | N/A      | TDD         | N/A                   |
| CA_n7-n66-n77                                            | n7      | 2560                    | 5              | 25                  | 2680                    | N/A      | FDD         | N/A                   |
|                                                          | n66     | 1730                    | 5              | 25                  | 2130                    | N/A      | FDD         | N/A                   |
|                                                          | n77     | N/A                     | 10             | N/A                 | 3390                    | 16.1     | TDD         | IMD3                  |
|                                                          | n7      | 2550                    | 5              | 25                  | 2670                    | N/A      | FDD         | N/A                   |
|                                                          | n66     | N/A                     | 5              | N/A                 | 2150                    | 8.7      | FDD         | IMD4                  |
|                                                          | n77     | 3625                    | 10             | 50                  | 3625                    | N/A      | TDD         | N/A                   |
|                                                          | n7      | N/A                     | 5              | N/A                 | 2640                    | 3.4      | FDD         | IMD5                  |
|                                                          | n66     | 1720                    | 5              | 25                  | 2120                    | N/A      | FDD         | N/A                   |
|                                                          | n77     | 3900                    | 10             | 50                  | 3900                    | N/A      | TDD         | N/A                   |
|                                                          | n7      | 2520                    | 5              | 25                  | 2640                    | N/A      | FDD         | N/A                   |
|                                                          | n66     | 1760                    | 5              | 25                  | 2160                    | N/A      | FDD         | N/A                   |
|                                                          | n77     | N/A                     | 10             | N/A                 | 4040                    | 4.2      | TDD         | IMD5                  |
| CA_n7-n66-n78                                            | n7      | 2560                    | 5              | 25                  | 2680                    | N/A      | FDD         | N/A                   |
|                                                          | n66     | 1730                    | 5              | 25                  | 2130                    | N/A      | FDD         | N/A                   |
|                                                          | n78     | N/A                     | 10             | N/A                 | 3390                    | 16.1     | TDD         | IMD3                  |
|                                                          | n7      | 2550                    | 5              | 25                  | 2670                    | N/A      | FDD         | N/A                   |
|                                                          | n66     | N/A                     | 5              | N/A                 | 2150                    | 8.7      | FDD         | IMD4                  |
| CA_n8-n40-n78                                            | n78     | 3625                    | 10             | 50                  | 3625                    | N/A      | TDD         | N/A                   |
|                                                          | n8      | N/A                     | 5              | N/A                 | 950                     | 30.5     | FDD         | IMD2                  |
|                                                          | n40     | 2380                    | 5              | 25                  | 2380                    | N/A      | TDD         | N/A                   |
|                                                          | n78     | 3330                    | 10             | 50                  | 3330                    | N/A      | TDD         | N/A                   |
|                                                          | n8      | N/A                     | 5              | N/A                 | 935                     | 19.8     | FDD         | IMD3                  |
|                                                          | n40     | 2320                    | 5              | 25                  | 2320                    | N/A      | TDD         | N/A                   |
|                                                          | n78     | 3705                    | 10             | 50                  | 3705                    | N/A      | TDD         | N/A                   |
|                                                          | n8      | 910                     | 5              | 25                  | 955                     | N/A      | FDD         | N/A                   |
|                                                          | n40     | N/A                     | 5              | N/A                 | 2395                    | 28       | TDD         | IMD2                  |
|                                                          | n78     | 3305                    | 10             | 50                  | 3305                    | N/A      | TDD         | N/A                   |
|                                                          | n8      | 910                     | 5              | 25                  | 955                     | N/A      | FDD         | N/A                   |
|                                                          | n40     | 2395                    | 10             | 50                  | 2395                    | N/A      | TDD         | N/A                   |
| CA_n12-n30-n77                                           | n78     | N/A                     | 10             | N/A                 | 3305                    | 28.8     | TDD         | IMD2 <sup>4</sup>     |
|                                                          | n12     | N/A                     | 5              | N/A                 | 740                     | 15.2     | FDD         | IMD3 <sup>1</sup>     |
|                                                          | n30     | 2310                    | 5              | 25                  | 2355                    | N/A      | FDD         | N/A                   |
|                                                          | n77     | 3880                    | 10             | 50                  | 3880                    | N/A      | TDD         | N/A                   |
|                                                          | n12     | 707.5                   | 5              | 25                  | 737.5                   | N/A      | FDD         | N/A                   |
|                                                          | n30     | N/A                     | 5              | N/A                 | 2355                    | 13.2     | FDD         | IMD3                  |
|                                                          | n77     | 3770                    | 10             | 50                  | 3770                    | N/A      | TDD         | N/A                   |
|                                                          | n12     | 707                     | 5              | 25                  | 737                     | N/A      | FDD         | N/A                   |
| CA_n12-n66-n77                                           | n30     | 2310                    | 5              | 25                  | 2355                    | N/A      | FDD         | N/A                   |
|                                                          | n77     | N/A                     | 10             | N/A                 | 3913                    | 16.0     | TDD         | IMD3                  |
|                                                          | n12     | N/A                     | 5              | 25                  | 740                     | 15.2     | FDD         | IMD3 <sup>5</sup>     |
|                                                          | n66     | 1720                    | 5              | 25                  | 2120                    | N/A      | FDD         | N/A                   |
|                                                          | n77     | 4180                    | 10             | 50                  | 4180                    | N/A      | TDD         | N/A                   |
|                                                          | n12     | 707                     | 5              | 25                  | 737                     | N/A      | FDD         | N/A                   |
|                                                          | n66     | N/A                     | 5              | N/A                 | 2126                    | 13.2     | FDD         | IMD3                  |
|                                                          | n77     | 3540                    | 10             | 50                  | 3540                    | N/A      | TDD         | N/A                   |
| CA_n13-n25-n66                                           | n12     | 704                     | 5              | 25                  | 734                     | N/A      | FDD         | N/A                   |
|                                                          | n66     | 1723                    | 5              | 25                  | 2123                    | N/A      | FDD         | N/A                   |
|                                                          | n77     | N/A                     | 10             | N/A                 | 4150                    | 16.0     | TDD         | IMD3 <sup>1,2,5</sup> |
|                                                          | n13     | 782                     | 5              | 25                  | 751                     | N/A      | FDD         | N/A                   |
|                                                          | n66     | N/A                     | 5              | N/A                 | 2156                    | 7..2     | FDD         | IMD4                  |
|                                                          | n25     | 1860                    | 5              | 25                  | 1940                    | N/A      | FDD         | N/A                   |
| CA_n13-n25-n77                                           | n13     | 780                     | 10             | 50                  | 749                     | N/A      | FDD         | N/A                   |
|                                                          | n25     | N/A                     | 5              | N/A                 | 1940                    | 6.2      | FDD         | IMD4                  |
|                                                          | n66     | 1750                    | 5              | 25                  | 2150                    | N/A      | FDD         | N/A                   |
|                                                          | n13     | 782                     | 5              | 25                  | 751                     | N/A      | FDD         | N/A                   |
|                                                          | n25     | 1896                    | 5              | 25                  | 1976                    | N/A      | FDD         | N/A                   |
|                                                          | n77     | N/A                     | 10             | N/A                 | 3460                    | 17.3     | TDD         | IMD3 <sup>1,2</sup>   |

| Band / Channel bandwidth / N <sub>RB</sub> / Duplex mode |         |                         |                |                     |                         |          |             | Source of IMD         |
|----------------------------------------------------------|---------|-------------------------|----------------|---------------------|-------------------------|----------|-------------|-----------------------|
| NR CA band combination                                   | NR band | UL F <sub>c</sub> (MHz) | UL/DL BW (MHz) | UL L <sub>CRB</sub> | DL F <sub>c</sub> (MHz) | MSD (dB) | Duplex mode |                       |
|                                                          | n13     | 782                     | 5              | 25                  | 751                     | N/A      | FDD         | N/A                   |
|                                                          | n25     | N/A                     | 5              | N/A                 | 1960                    | 16.0     | FDD         | IMD3                  |
|                                                          | n77     | 3524                    | 10             | 50                  | 3524                    | N/A      | TDD         | N/A                   |
| CA_n13-n66-n77                                           | n13     | 782                     | 5              | 25                  | 751                     | N/A      | FDD         | N/A                   |
|                                                          | n66     | N/A                     | 5              | N/A                 | 2146                    | 17.1     | FDD         | IMD3                  |
|                                                          | n77     | 3710                    | 10             | 50                  | 3710                    | N/A      | TDD         | N/A                   |
|                                                          | n13     | N/A                     | 5              | N/A                 | 750                     | 15.2     | FDD         | IMD3 <sup>5</sup>     |
|                                                          | n66     | 1710                    | 5              | 25                  | 2110                    | N/A      | FDD         | N/A                   |
|                                                          | n77     | 4170                    | 10             | 50                  | 4170                    | N/A      | TDD         | N/A                   |
|                                                          | n13     | 782                     | 5              | 25                  | 751                     | N/A      | FDD         | N/A                   |
|                                                          | n66     | 1770                    | 5              | 25                  | 2170                    | N/A      | FDD         | N/A                   |
|                                                          | n77     | N/A                     | 10             | N/A                 | 3334                    | 16.3     | TDD         | IMD3 <sup>1,2,5</sup> |
| CA_n14-n30-n77                                           | n14     | N/A                     | 5              | N/A                 | 763                     | 15.2     | FDD         | IMD3 <sup>1</sup>     |
|                                                          | n30     | 2310                    | 5              | 25                  | 2355                    | N/A      | FDD         | N/A                   |
|                                                          | n77     | 3857                    | 10             | 50                  | 3857                    | N/A      | TDD         | N/A                   |
|                                                          | n14     | 793                     | 5              | 25                  | 763                     | N/A      | FDD         | N/A                   |
|                                                          | n30     | N/A                     | 5              | N/A                 | 2355                    | 13.2     | FDD         | IMD3                  |
|                                                          | n77     | 3941                    | 10             | 50                  | 3941                    | N/A      | TDD         | N/A                   |
|                                                          | n14     | 793                     | 5              | 25                  | 763                     | N/A      | FDD         | N/A                   |
|                                                          | n30     | 2310                    | 5              | 25                  | 2355                    | N/A      | FDD         | N/A                   |
|                                                          | n77     | N/A                     | 10             | N/A                 | 3896                    | 16.0     | TDD         | IMD3                  |
| CA_n14-n66-n77                                           | n14     | N/A                     | 5              | N/A                 | 763                     | 15.2     | FDD         | IMD3 <sup>5</sup>     |
|                                                          | n66     | 1712.5                  | 5              | 25                  | 2112.5                  | N/A      | FDD         | N/A                   |
|                                                          | n77     | 4188                    | 10             | 50                  | 4188                    | N/A      | TDD         | N/A                   |
|                                                          | n14     | 793                     | 5              | 25                  | 763                     | N/A      | FDD         | N/A                   |
|                                                          | n66     | N/A                     | 5              | N/A                 | 2155                    | 13.2     | FDD         | IMD3                  |
|                                                          | n77     | 3741                    | 10             | 50                  | 3741                    | N/A      | TDD         | N/A                   |
|                                                          | n14     | 793                     | 5              | 25                  | 763                     | N/A      | FDD         | N/A                   |
|                                                          | n66     | 1755                    | 5              | 25                  | 2155                    | N/A      | FDD         | N/A                   |
|                                                          | n77     | N/A                     | 10             | N/A                 | 3341                    | 16.0     | TDD         | IMD3 <sup>1,2,5</sup> |
| CA_n18-n28-n41                                           | n18     | 825                     | 5              | 25                  | 870                     | N/A      | FDD         | N/A                   |
|                                                          | n28     | 738                     | 5              | 25                  | 793                     | N/A      | FDD         | N/A                   |
|                                                          | n41     | N/A                     | 10             | N/A                 | 2562                    | 4.4      | TDD         | IMD5                  |
|                                                          | n18     | 825                     | 5              | 25                  | 870                     | N/A      | FDD         | N/A                   |
|                                                          | n41     | 2505                    | 10             | 50                  | 2505                    | N/A      | TDD         | N/A                   |
|                                                          | n28     | N/A                     | 5              | N/A                 | 795                     | 3.9      | FDD         | IMD5                  |
| CA_n18-n28-n77                                           | n18     | 820                     | 5              | 25                  | 865                     | N/A      | FDD         | N/A                   |
|                                                          | n28     | 710                     | 5              | 25                  | 765                     | N/A      | FDD         | N/A                   |
|                                                          | n77     | N/A                     | 10             | N/A                 | 3770                    | 4.0      | TDD         | IMD5                  |
|                                                          | n18     | 820                     | 5              | 25                  | 865                     | N/A      | FDD         | N/A                   |
|                                                          | n28     | N/A                     | 5              | N/A                 | 778                     | 4.4      | FDD         | IMD5                  |
|                                                          | n77     | 4058                    | 10             | 50                  | 4058                    | N/A      | TDD         | N/A                   |
|                                                          | n18     | N/A                     | 5              | N/A                 | 865                     | 3.9      | FDD         | IMD5                  |
|                                                          | n28     | 723                     | 5              | 25                  | 778                     | N/A      | FDD         | N/A                   |
|                                                          | n77     | 3757                    | 10             | 50                  | 3757                    | N/A      | TDD         | N/A                   |
| CA_n18-n41-n77                                           | n18     | 820                     | 5              | 25                  | 865                     | N/A      | FDD         | N/A                   |
|                                                          | n41     | 2570                    | 5              | 25                  | 2570                    | N/A      | TDD         | N/A                   |
|                                                          | n77     | N/A                     | 10             | N/A                 | 3390                    | 30.1     | TDD         | IMD2 <sup>2,4</sup>   |
|                                                          | n18     | 820                     | 5              | 25                  | 865                     | N/A      | FDD         | N/A                   |
|                                                          | n77     | 3450                    | 10             | 50                  | 3450                    | N/A      | TDD         | N/A                   |
|                                                          | n41     | N/A                     | 5              | N/A                 | 2630                    | 28.5     | TDD         | IMD2 <sup>4</sup>     |
|                                                          | n41     | 2590                    | 10             | 50                  | 2590                    | N/A      | TDD         | N/A                   |
|                                                          | n77     | 3460                    | 10             | 50                  | 3460                    | N/A      | TDD         | N/A                   |
| CA_n24-n41-n48                                           | n18     | N/A                     | 5              | N/A                 | 870                     | 29.3     | FDD         | IMD2 <sup>1,4</sup>   |
|                                                          | n24     | 1649                    | 5              | 25                  | 1528.5                  | N/A      | FDD         | N/A                   |
|                                                          | n41     | 2610                    | 5              | 25                  | 2610                    | N/A      | TDD         | N/A                   |
|                                                          | n48     | N/A                     | 10             | N/A                 | 3571                    | 16.8     | TDD         | IMD3                  |
|                                                          | n24     | 1630                    | 5              | 25                  | 1528.5                  | N/A      | FDD         | N/A                   |
|                                                          | n41     | N/A                     | 5              | N/A                 | 2500                    | 5.3      | TDD         | IMD5                  |
|                                                          | n48     | 3695                    | 10             | 50                  | 3695                    | N/A      | TDD         | N/A                   |

| Band / Channel bandwidth / N <sub>RB</sub> / Duplex mode |         |                            |                      |                        |                            |             |                | Source of<br>IMD    |
|----------------------------------------------------------|---------|----------------------------|----------------------|------------------------|----------------------------|-------------|----------------|---------------------|
| NR CA band<br>combination                                | NR band | UL F <sub>c</sub><br>(MHz) | UL/DL<br>BW<br>(MHz) | UL<br>L <sub>CRB</sub> | DL F <sub>c</sub><br>(MHz) | MSD<br>(dB) | Duplex<br>mode |                     |
|                                                          | n24     | N/A                        | 5                    | N/A                    | 1530                       | 16.4        | FDD            | IMD3                |
|                                                          | n41     | 2592.5                     | 5                    | 25                     | 2592.5                     | N/A         | TDD            | N/A                 |
|                                                          | n48     | 3655                       | 10                   | 50                     | 3655                       | N/A         | TDD            | N/A                 |
| CA_n24-n41-n77                                           | n24     | 1630                       | 5                    | 25                     | 1528.5                     | N/A         | FDD            | N/A                 |
|                                                          | n41     | 2685                       | 5                    | 25                     | 2685                       | N/A         | TDD            | N/A                 |
|                                                          | n77     | N/A                        | 10                   | N/A                    | 3735                       | 16.8        | TDD            | IMD3 <sup>1,6</sup> |
|                                                          | n24     | 1630                       | 5                    | 25                     | 1528.5                     | N/A         | FDD            | N/A                 |
|                                                          | n41     | N/A                        | 5                    | N/A                    | 2610                       | 5.3         | TDD            | IMD5 <sup>6</sup>   |
|                                                          | n77     | 3755                       | 10                   | 50                     | 3755                       | N/A         | TDD            | N/A                 |
|                                                          | n24     | N/A                        | 5                    | N/A                    | 1528.5                     | 16.4        | FDD            | IMD3 <sup>2,6</sup> |
|                                                          | n41     | 2500                       | 5                    | 25                     | 2500                       | N/A         | TDD            | N/A                 |
|                                                          | n77     | 3465                       | 10                   | 50                     | 3465                       | N/A         | TDD            | N/A                 |
| CA_n25-n38-n78                                           | n25     | N/A                        | 5                    | N/A                    | 1932.5                     | 16.4        | FDD            | IMD3                |
|                                                          | n38     | 2617.5                     | 5                    | 25                     | 2617.5                     | N/A         | TDD            | N/A                 |
|                                                          | n78     | 3305                       | 10                   | 50                     | 3305                       | N/A         | TDD            | N/A                 |
|                                                          | n25     | 1870                       | 5                    | 25                     | 1950                       | N/A         | FDD            | N/A                 |
|                                                          | n38     | 2610                       | 5                    | 25                     | 2610                       | N/A         | TDD            | N/A                 |
|                                                          | n78     | N/A                        | 10                   | N/A                    | 3350                       | 14.8        | TDD            | IMD3                |
|                                                          | n25     | N/A                        | 5                    | N/A                    | 1960                       | 8.6         | TDD            | IMD4                |
|                                                          | n38     | 2570                       | 5                    | 25                     | 2570                       | N/A         | FDD            | N/A                 |
|                                                          | n78     | 3550                       | 10                   | 50                     | 3550                       | N/A         | TDD            | N/A                 |
| CA_n25-n41-n66                                           | n25     | N/A                        | 5                    | N/A                    | 1940                       | 11.0        | FDD            | IMD4                |
|                                                          | n41     | 2685                       | 10                   | 50                     | 2685                       | N/A         | TDD            | N/A                 |
|                                                          | n66     | 1715                       | 5                    | 25                     | 2115                       | N/A         | FDD            | N/A                 |
| CA_n25-n41-n77                                           | n25     | 1870                       | 5                    | 25                     | 1950                       | N/A         | FDD            | N/A                 |
|                                                          | n41     | 2670                       | 5                    | 25                     | 2670                       | N/A         | TDD            | N/A                 |
|                                                          | n77     | N/A                        | 10                   | N/A                    | 3470                       | 14.8        | TDD            | IMD3                |
|                                                          | n25     | 1900                       | 5                    | 25                     | 1980                       | N/A         | FDD            | N/A                 |
|                                                          | n41     | 2525                       | 5                    | 25                     | 2645                       | N/A         | TDD            | N/A                 |
|                                                          | n77     | N/A                        | 10                   | N/A                    | 3775                       | 4.2         | TDD            | IMD5                |
|                                                          | n25     | 1870                       | 5                    | 25                     | 1950                       | N/A         | FDD            | N/A                 |
|                                                          | n41     | N/A                        | 5                    | N/A                    | 2640                       | 5.3         | TDD            | IMD5 <sup>5</sup>   |
|                                                          | n77     | 4125                       | 10                   | 50                     | 4125                       | N/A         | TDD            | N/A                 |
|                                                          | n25     | N/A                        | 5                    | N/A                    | 1950                       | 17.6        | FDD            | IMD3 <sup>5</sup>   |
|                                                          | n41     | 2675                       | 5                    | 25                     | 2675                       | N/A         | TDD            | N/A                 |
|                                                          | n77     | 3400                       | 10                   | 50                     | 3400                       | N/A         | TDD            | N/A                 |
|                                                          | n25     | N/A                        | 5                    | N/A                    | 1950                       | 8.6         | FDD            | IMD4                |
|                                                          | n41     | 2550                       | 5                    | 25                     | 2685                       | N/A         | TDD            | N/A                 |
|                                                          | n77     | 3525                       | 10                   | 50                     | 3525                       | N/A         | TDD            | N/A                 |
|                                                          | n25     | 1870                       | 5                    | 25                     | 1950                       | N/A         | FDD            | N/A                 |
|                                                          | n41     | 2610                       | 5                    | 25                     | 2610                       | N/A         | TDD            | N/A                 |
| CA_n25-n41-n78                                           | n78     | N/A                        | 10                   | N/A                    | 3350                       | 14.8        | TDD            | IMD3                |
|                                                          | n25     | 1900                       | 5                    | 25                     | 1980                       | N/A         | FDD            | N/A                 |
|                                                          | n41     | 2525                       | 5                    | 25                     | 2645                       | N/A         | TDD            | N/A                 |
|                                                          | n78     | N/A                        | 10                   | N/A                    | 3775                       | 4.2         | TDD            | IMD5                |
|                                                          | n25     | N/A                        | 5                    | N/A                    | 1950                       | 17.6        | FDD            | IMD3                |
|                                                          | n41     | 2565                       | 5                    | 25                     | 2565                       | N/A         | TDD            | N/A                 |
|                                                          | n78     | 3180                       | 10                   | 50                     | 3310                       | N/A         | TDD            | N/A                 |
|                                                          | n25     | N/A                        | 5                    | N/A                    | 1950                       | 8.6         | FDD            | IMD4                |
|                                                          | n41     | 2550                       | 5                    | 25                     | 2685                       | N/A         | TDD            | N/A                 |
|                                                          | n78     | 3525                       | 10                   | 50                     | 3475                       | N/A         | TDD            | N/A                 |
|                                                          | n25     | 1900                       | 5                    | 25                     | 1980                       | N/A         | FDD            | N/A                 |
|                                                          | n48     | 3540                       | 10                   | 50                     | 3540                       | N/A         | TDD            | N/A                 |
| CA_n25-n48-n66                                           | n66     | N/A                        | 5                    | N/A                    | 2160                       | 10.4        | FDD            | IMD4                |
|                                                          | n25     | 1880                       | 5                    | 25                     | 1960                       | N/A         | FDD            | N/A                 |
|                                                          | n48     | N/A                        | 10                   | N/A                    | 3620                       | 29.4        | TDD            | IMD2                |
|                                                          | n66     | 1740                       | 5                    | 25                     | 2140                       | N/A         | FDD            | N/A                 |
|                                                          | n25     | N/A                        | 5                    | N/A                    | 1960                       | 32.1        | FDD            | IMD2 <sup>1</sup>   |
|                                                          | n48     | 3700                       | 10                   | 50                     | 3700                       | N/A         | TDD            | N/A                 |
|                                                          | n66     | 1740                       | 5                    | 25                     | 2140                       | N/A         | FDD            | N/A                 |

| Band / Channel bandwidth / N <sub>RB</sub> / Duplex mode |         |                            |                      |                        |                            |             |                | Source of<br>IMD      |
|----------------------------------------------------------|---------|----------------------------|----------------------|------------------------|----------------------------|-------------|----------------|-----------------------|
| NR CA band<br>combination                                | NR band | UL F <sub>c</sub><br>(MHz) | UL/DL<br>BW<br>(MHz) | UL<br>L <sub>CRB</sub> | DL F <sub>c</sub><br>(MHz) | MSD<br>(dB) | Duplex<br>mode |                       |
| CA_n25-n66-n77                                           | n25     | 1855                       | 5                    | 25                     | 1935                       | N/A         | FDD            | N/A                   |
|                                                          | n66     | N/A                        | 5                    | N/A                    | 2115                       | 29.2        | FDD            | IMD2                  |
|                                                          | n77     | 3970                       | 10                   | 50                     | 3970                       | N/A         | TDD            | N/A                   |
|                                                          | n25     | 1900                       | 5                    | 25                     | 1980                       | N/A         | FDD            | N/A                   |
|                                                          | n66     | N/A                        | 5                    | N/A                    | 2160                       | 10.4        | FDD            | IMD4                  |
|                                                          | n77     | 3540                       | 10                   | 50                     | 3540                       | 10          | TDD            | N/A                   |
|                                                          | n25     | 1900                       | 5                    | 25                     | 1980                       | N/A         | FDD            | N/A                   |
|                                                          | n66     | N/A                        | 5                    | N/A                    | 2160                       | 4.0         | FDD            | IMD5                  |
|                                                          | n77     | 3930                       | 10                   | 50                     | 3930                       | N/A         | TDD            | N/A                   |
|                                                          | n25     | N/A                        | 5                    | N/A                    | 1960                       | 32.1        | FDD            | IMD2                  |
|                                                          | n66     | 1760                       | 5                    | 25                     | 2160                       | N/A         | FDD            | N/A                   |
|                                                          | n77     | 3720                       | 10                   | 50                     | 3720                       | N/A         | TDD            | N/A                   |
|                                                          | n25     | N/A                        | 5                    | N/A                    | 1960                       | 9.1         | FDD            | IMD4 <sup>5</sup>     |
|                                                          | n66     | 1770                       | 5                    | 25                     | 2170                       | N/A         | FDD            | N/A                   |
|                                                          | n77     | 3350                       | 10                   | 50                     | 3350                       | N/A         | TDD            | N/A                   |
|                                                          | n25     | N/A                        | 5                    | N/A                    | 1960                       | 2.1         | FDD            | IMD5 <sup>5</sup>     |
|                                                          | n66     | 1760                       | 5                    | 25                     | 2160                       | N/A         | FDD            | N/A                   |
|                                                          | n77     | 3620                       | 10                   | 50                     | 3620                       | N/A         | TDD            | N/A                   |
|                                                          | n25     | 1880                       | 5                    | 25                     | 1960                       | N/A         | FDD            | N/A                   |
|                                                          | n66     | 1740                       | 5                    | 25                     | 2140                       | N/A         | FDD            | N/A                   |
|                                                          | n77     | N/A                        | 10                   | N/A                    | 3620                       | 29.4        | TDD            | IMD2 <sup>5</sup>     |
|                                                          | n25     | 1880                       | 5                    | 25                     | 1960                       | N/A         | FDD            | N/A                   |
|                                                          | n66     | 1740                       | 5                    | 25                     | 2140                       | N/A         | FDD            | N/A                   |
|                                                          | n77     | N/A                        | 10                   | N/A                    | 3900                       | 8.9         | TDD            | IMD4                  |
| CA_n25-n66-n78                                           | n25     | 1880                       | 5                    | 25                     | 1960                       | N/A         | FDD            | N/A                   |
|                                                          | n66     | 1740                       | 5                    | 25                     | 2140                       | N/A         | FDD            | N/A                   |
|                                                          | n78     | N/A                        | 10                   | N/A                    | 3620                       | 29.4        | TDD            | IMD2                  |
| CA_n25-n71-n77                                           | n25     | 1907.5                     | 5                    | 25                     | 1987.5                     | N/A         | FDD            | N/A                   |
|                                                          | n71     | 695.5                      | 5                    | 25                     | 649.5                      | N/A         | FDD            | N/A                   |
|                                                          | n77     | N/A                        | 10                   | N/A                    | 3305                       | 8.0         | TDD            | IMD3 <sup>1,2,5</sup> |
|                                                          | n25     | N/A                        | 5                    | N/A                    | 1954                       | 16.5        | FDD            | IMD3 <sup>2,5</sup>   |
|                                                          | n71     | 693                        | 5                    | 25                     | 647                        | N/A         | FDD            | N/A                   |
| CA_n25-n71-n78                                           | n77     | 3340                       | 10                   | 50                     | 3340                       | N/A         | TDD            | N/A                   |
|                                                          | n25     | 1907.5                     | 5                    | 25                     | 1987.5                     | N/A         | FDD            | N/A                   |
|                                                          | n71     | 695.5                      | 5                    | 25                     | 649.5                      | N/A         | FDD            | N/A                   |
|                                                          | n78     | N/A                        | 10                   | N/A                    | 3305                       | 8.0         | TDD            | IMD3                  |
|                                                          | n25     | N/A                        | 5                    | N/A                    | 1954                       | 16.5        | FDD            | IMD3                  |
|                                                          | n71     | 693                        | 5                    | 25                     | 647                        | N/A         | FDD            | N/A                   |
| CA_n28-n39-n41                                           | n78     | 3340                       | 10                   | 50                     | 3340                       | N/A         | TDD            | N/A                   |
|                                                          | n28     | N/A                        | 5                    | N/A                    | 762                        | 29.3        | FDD            | IMD2                  |
|                                                          | n39     | 1923                       | 5                    | 25                     | 1923                       | N/A         | TDD            | N/A                   |
|                                                          | n41     | 2685                       | 10                   | 50                     | 2685                       | N/A         | TDD            | N/A                   |
| CA_n28-n40-n41                                           | n28     | N/A                        | 5                    | N/A                    | 765                        | 7.6         | FDD            | IMD4                  |
|                                                          | n40     | 2302.5                     | 5                    | 25                     | 2302.5                     | N/A         | TDD            | N/A                   |
|                                                          | n41     | 2685                       | 10                   | 50                     | 2685                       | N/A         | TDD            | N/A                   |
| CA_n28-n40-n78                                           | n28     | N/A                        | 5                    | N/A                    | 800.5                      | 11          | IMD3           | IMD3                  |
|                                                          | n40     | 2302.5                     | 5                    | 25                     | 2302.5                     | N/A         | N/A            | N/A                   |
|                                                          | n78     | 3795                       | 10                   | 50                     | 3795                       | N/A         | N/A            | N/A                   |
|                                                          | n28     | 708                        | 5                    | 25                     | 763                        | N/A         | FDD            | N/A                   |
|                                                          | n40     | 2310                       | 5                    | 25                     | 2310                       | N/A         | TDD            | N/A                   |
|                                                          | n78     | N/A                        | 10                   | N/A                    | 3726                       | 26.7        | TDD            | IMD3 <sup>2</sup>     |
|                                                          | n28     | 708                        | 5                    | 25                     | 763                        | N/A         | FDD            | N/A                   |
|                                                          | n40     | N/A                        | 5                    | N/A                    | 2379                       | 12.3        | TDD            | IMD3                  |
|                                                          | n78     | 3795                       | 10                   | 50                     | 3795                       | N/A         | TDD            | N/A                   |
| CA_n28-n40-n79                                           | n28     | 730                        | 5                    | 25                     | 785                        | N/A         | FDD            | N/A                   |
|                                                          | n40     | 2350                       | 5                    | 50                     | 2350                       | N/A         | TDD            | N/A                   |
|                                                          | n79     | N/A                        | 40                   | N/A                    | 4540                       | 10.7        | TDD            | IMD4                  |
|                                                          | n28     | 720                        | 5                    | 25                     | 775                        | N/A         | FDD            | N/A                   |
|                                                          | n40     | N/A                        | 5                    | N/A                    | 2340                       | 9.2         | TDD            | IMD4                  |
|                                                          | n79     | 4500                       | 40                   | 216                    | 4500                       | N/A         | TDD            | N/A                   |

| Band / Channel bandwidth / N <sub>RB</sub> / Duplex mode |         |                         |                |                     |                         |          |             | Source of IMD         |
|----------------------------------------------------------|---------|-------------------------|----------------|---------------------|-------------------------|----------|-------------|-----------------------|
| NR CA band combination                                   | NR band | UL F <sub>c</sub> (MHz) | UL/DL BW (MHz) | UL L <sub>CRB</sub> | DL F <sub>c</sub> (MHz) | MSD (dB) | Duplex mode |                       |
| CA_n28-n41-n77                                           | n41     | 2642                    | 5              | 25                  | 2642                    | N/A      | TDD         | N/A                   |
|                                                          | n77     | 3440                    | 10             | 50                  | 3440                    | N/A      | TDD         | N/A                   |
|                                                          | n28     | N/A                     | 5              | N/A                 | 798                     | 30.8     | FDD         | IMD2 <sup>4</sup>     |
|                                                          | n41     | 2567.5                  | 10             | 50                  | 2567.5                  | N/A      | TDD         | N/A                   |
|                                                          | n77     | 3460                    | 10             | 50                  | 3460                    | N/A      | TDD         | N/A                   |
|                                                          | n28     | N/A                     | 5              | N/A                 | 782.5                   | 3.0      | FDD         | IMD5                  |
|                                                          | n28     | 738                     | 5              | 25                  | 793                     | N/A      | FDD         | N/A                   |
|                                                          | n77     | 3380                    | 10             | 50                  | 3380                    | N/A      | TDD         | N/A                   |
|                                                          | n41     | N/A                     | 5              | N/A                 | 2642                    | 29.5     | TDD         | IMD2                  |
|                                                          | n41     | 2580                    | 5              | 25                  | 2580                    | N/A      | TDD         | N/A                   |
| CA_n28-n41-n78                                           | n28     | 743                     | 5              | 25                  | 798                     | N/A      | FDD         | N/A                   |
|                                                          | n77     | N/A                     | 10             | N/A                 | 3323                    | 28.2     | TDD         | IMD2 <sup>4</sup>     |
|                                                          | n28     | 738                     | 5              | 25                  | 793                     | N/A      | FDD         | N/A                   |
|                                                          | n78     | 3380                    | 10             | 50                  | 3380                    | N/A      | TDD         | N/A                   |
|                                                          | n41     | N/A                     | 5              | N/A                 | 2642                    | 29.5     | TDD         | IMD2                  |
|                                                          | n41     | 2642                    | 5              | 25                  | 2642                    | N/A      | TDD         | N/A                   |
|                                                          | n78     | 3440                    | 10             | 50                  | 3440                    | N/A      | TDD         | N/A                   |
|                                                          | n28     | N/A                     | 5              | N/A                 | 798                     | 30.8     | FDD         | IMD2 <sup>1</sup>     |
|                                                          | n41     | 2565                    | 5              | 25                  | 2565                    | N/A      | TDD         | N/A                   |
|                                                          | n28     | 745                     | 5              | 25                  | 800                     | N/A      | FDD         | N/A                   |
| CA_n28-n41-n79                                           | n78     | N/A                     | 10             | N/A                 | 3310                    | 29.7     | TDD         | IMD2 <sup>2</sup>     |
|                                                          | n28     | N/A                     | 5              | N/A                 | 780                     | 13.0     | FDD         | IMD3 <sup>1</sup>     |
|                                                          | n41     | 2600                    | 10             | 50                  | 2600                    | N/A      | TDD         | N/A                   |
|                                                          | n79     | 4420                    | 40             | 216                 | 4420                    | N/A      | TDD         | N/A                   |
|                                                          | n28     | 720                     | 5              | 25                  | 775                     | N/A      | FDD         | N/A                   |
|                                                          | n41     | 2600                    | 10             | 50                  | 2600                    | N/A      | TDD         | N/A                   |
|                                                          | n79     | N/A                     | 40             | N/A                 | 4480                    | 10.1     | TDD         | IMD3 <sup>2</sup>     |
|                                                          | n28     | 735                     | 5              | 25                  | 790                     | N/A      | FDD         | N/A                   |
|                                                          | n41     | N/A                     | 10             | N/A                 | 2645                    | 10.4     | TDD         | IMD4                  |
|                                                          | n79     | 4850                    | 40             | 216                 | 4850                    | N/A      | TDD         | N/A                   |
| CA_n28-n46-n78                                           | n28     | 710                     | 5              | 25                  | 765                     | N/A      | FDD         | N/A                   |
|                                                          | n46     | 5170                    | 20             | 100                 | 5170                    | N/A      | FDD         | N/A                   |
|                                                          | n78     | N/A                     | 10             | N/A                 | 3750                    | 17       | TDD         | IMD3 <sup>1</sup>     |
|                                                          | n28     | N/A                     | 5              | N/A                 | 780                     | 16       | FDD         | IMD3                  |
|                                                          | n46     | 5900                    | 20             | 100                 | 5900                    | N/A      | FDD         | N/A                   |
|                                                          | n78     | 3340                    | 10             | 50                  | 3340                    | N/A      | TDD         | N/A                   |
|                                                          | n28     | 740                     | 5              | 25                  | 795                     | N/A      | FDD         | N/A                   |
|                                                          | n46     | N/A                     | 20             | N/A                 | 5900                    | 22       | TDD         | IMD3 <sup>1,2</sup>   |
|                                                          | n78     | 3320                    | 10             | 50                  | 3320                    | N/A      | TDD         | N/A                   |
|                                                          | n77     | 3620                    | 10             | 52                  | 3620                    | N/A      | TDD         | N/A                   |
| CA_n28-n77-n79                                           | n79     | 4420                    | 40             | 216                 | 4420                    | N/A      | TDD         | N/A                   |
|                                                          | n28     | N/A                     | 5              | N/A                 | 800                     | 16.2     | FDD         | IMD2 <sup>1,2</sup>   |
|                                                          | n28     | N/A                     | 5              | N/A                 | 800                     | 16.2     | FDD         | IMD2 <sup>1,2</sup>   |
| CA_n28-n78-n79                                           | n28     | 740                     | 5              | 25                  | 795                     | N/A      | FDD         | N/A                   |
|                                                          | n78     | 3700                    | 10             | 50                  | 3700                    | N/A      | TDD         | N/A                   |
|                                                          | n79     | N/A                     | 40             | N/A                 | 4440                    | 26.2     | TDD         | IMD2 <sup>1,3,4</sup> |
|                                                          | n28     | 740                     | 5              | 25                  | 795                     | N/A      | FDD         | N/A                   |
|                                                          | n78     | N/A                     | 10             | N/A                 | 3700                    | 26.9     | TDD         | IMD2 <sup>3,4</sup>   |
|                                                          | n79     | 4440                    | 40             | 216                 | 4440                    | N/A      | TDD         | N/A                   |
|                                                          | n28     | N/A                     | 5              | N/A                 | 800                     | 16.2     | FDD         | IMD2 <sup>1</sup>     |
|                                                          | n78     | 3620                    | 10             | 50                  | 3620                    | N/A      | TDD         | N/A                   |
|                                                          | n79     | 4420                    | 40             | 216                 | 4420                    | N/A      | TDD         | N/A                   |
|                                                          | n28     | N/A                     | 5              | N/A                 | 800                     | 16.2     | FDD         | IMD2 <sup>1</sup>     |
| CA_n29-n30-n66                                           | n29     | N/A                     | 5              | N/A                 | 719.5                   | 4.5      | SDL         | IMD5                  |
|                                                          | n30     | 2307.5                  | 5              | 25                  | 2352.5                  | N/A      | FDD         | N/A                   |
|                                                          | n66     | 1777.5                  | 5              | 25                  | 2177.5                  | N/A      | FDD         | N/A                   |
| CA_n29-n30-n77                                           | n29     | N/A                     | 5              | N/A                 | 722                     | 15.2     | SDL         | IMD3 <sup>1</sup>     |
|                                                          | n30     | 2310                    | 5              | 25                  | 2355                    | N/A      | FDD         | N/A                   |
|                                                          | n77     | 3898                    | 10             | 50                  | 3898                    | N/A      | TDD         | N/A                   |
| CA_n29-n66-n77                                           | n29     | N/A                     | 5              | N/A                 | 722                     | 15.2     | SDL         | IMD3 <sup>7</sup>     |
|                                                          | n66     | 1734                    | 5              | 25                  | 2134                    | N/A      | FDD         | N/A                   |
|                                                          | n77     | 4190                    | 10             | 50                  | 4190                    | N/A      | TDD         | N/A                   |



| Band / Channel bandwidth / N <sub>RB</sub> / Duplex mode |         |                            |                      |                        |                            |             |                | Source of<br>IMD    |
|----------------------------------------------------------|---------|----------------------------|----------------------|------------------------|----------------------------|-------------|----------------|---------------------|
| NR CA band<br>combination                                | NR band | UL F <sub>c</sub><br>(MHz) | UL/DL<br>BW<br>(MHz) | UL<br>L <sub>CRB</sub> | DL F <sub>c</sub><br>(MHz) | MSD<br>(dB) | Duplex<br>mode |                     |
| CA_n30-n66-n77                                           | n30     | N/A                        | 5                    | N/A                    | 2355                       | 29.2        | FDD            | IMD2 <sup>5</sup>   |
|                                                          | n66     | 1745                       | 5                    | 25                     | 2145                       | N/A         | FDD            | N/A                 |
|                                                          | n77     | 4100                       | 10                   | 50                     | 4100                       | N/A         | TDD            | N/A                 |
|                                                          | n30     | N/A                        | 5                    | N/A                    | 2355                       | 3.4         | FDD            | IMD5                |
|                                                          | n66     | 1735                       | 5                    | 25                     | 2135                       | N/A         | FDD            | N/A                 |
|                                                          | n77     | 3780                       | 10                   | 50                     | 3780                       | N/A         | TDD            | N/A                 |
|                                                          | n30     | 2310                       | 5                    | 25                     | 2355                       | N/A         | FDD            | N/A                 |
|                                                          | n66     | N/A                        | 5                    | N/A                    | 2160                       | 8.7         | FDD            | IMD4 <sup>5</sup>   |
|                                                          | n77     | 3390                       | 10                   | 50                     | 3390                       | N/A         | TDD            | N/A                 |
|                                                          | n30     | 2310                       | 5                    | 25                     | 2355                       | N/A         | FDD            | N/A                 |
| CA_n38-n66-n78                                           | n66     | 1745                       | 5                    | 25                     | 2145                       | N/A         | FDD            | N/A                 |
|                                                          | n77     | N/A                        | 10                   | N/A                    | 4055                       | 28.4        | TDD            | IMD2 <sup>1,5</sup> |
|                                                          | n38     | 2550                       | 5                    | 25                     | 2550                       | N/A         | TDD            | N/A                 |
|                                                          | n66     | N/A                        | 5                    | N/A                    | 2150                       | 8.7         | FDD            | IMD4                |
|                                                          | n78     | 3625                       | 10                   | 50                     | 3625                       | N/A         | TDD            | N/A                 |
|                                                          | n38     | 2610                       | 5                    | 25                     | 2610                       | N/A         | TDD            | N/A                 |
| CA_n39-n40-n79                                           | n66     | 1760                       | 5                    | 25                     | 2160                       | N/A         | FDD            | N/A                 |
|                                                          | n78     | N/A                        | 10                   | N/A                    | 3460                       | 15.0        | TDD            | IMD3                |
|                                                          | n39     | 1917.5                     | 5                    | 25                     | 1917.5                     | N/A         | TDD            | N/A                 |
| CA_n40-n41-n79                                           | n40     | 2302.5                     | 5                    | 25                     | 2302.5                     | N/A         | TDD            | N/A                 |
|                                                          | n79     | N/A                        | 40                   | N/A                    | 4980                       | 5.8         | TDD            | IMD4                |
|                                                          | n40     | 2340                       | 5                    | 25                     | 2340                       | N/A         | TDD            | N/A                 |
| CA_n41-n66-n77                                           | n41     | 2600                       | 10                   | 50                     | 2600                       | N/A         | TDD            | N/A                 |
|                                                          | n79     | N/A                        | 40                   | N/A                    | 4940                       | 30.5        | TDD            | IMD2                |
|                                                          | n41     | 2600                       | 5                    | 25                     | 2600                       | N/A         | TDD            | N/A                 |
|                                                          | n66     | 1730                       | 5                    | 25                     | 2130                       | N/A         | FDD            | N/A                 |
|                                                          | n77     | N/A                        | 10                   | N/A                    | 3470                       | 16.1        | TDD            | IMD3 <sup>1,2</sup> |
|                                                          | n41     | N/A                        | 5                    | N/A                    | 2670                       | 5.2         | TDD            | IMD5 <sup>5</sup>   |
|                                                          | n66     | 1715                       | 5                    | 25                     | 2115                       | N/A         | FDD            | N/A                 |
|                                                          | n77     | 4190                       | 10                   | 50                     | 4190                       | N/A         | TDD            | N/A                 |
|                                                          | n41     | 2640                       | 5                    | 25                     | 2640                       | N/A         | TDD            | N/A                 |
| CA_n41-n66-n78                                           | n66     | N/A                        | 5                    | N/A                    | 2160                       | 9.0         | FDD            | IMD4                |
|                                                          | n77     | 3720                       | 10                   | 50                     | 3720                       | N/A         | TDD            | N/A                 |
|                                                          | n41     | 2560                       | 5                    | 25                     | 2560                       | N/A         | TDD            | N/A                 |
|                                                          | n66     | 1730                       | 5                    | 25                     | 2130                       | N/A         | FDD            | N/A                 |
|                                                          | n77     | N/A                        | 10                   | N/A                    | 3390                       | 16.1        | TDD            | IMD3 <sup>1</sup>   |
|                                                          | n41     | 2530                       | 5                    | 25                     | 2530                       | N/A         | TDD            | N/A                 |
|                                                          | n66     | N/A                        | 5                    | N/A                    | 2160                       | 9.0         | FDD            | IMD4                |
|                                                          | n77     | 3610                       | 10                   | 50                     | 3610                       | N/A         | TDD            | N/A                 |
| CA_n41-n70-n78                                           | n41     | 2655                       | 10                   | 50                     | 2655                       | N/A         | TDD            | N/A                 |
|                                                          | n70     | N/A                        | 5                    | N/A                    | 2000                       | 17.6        | FDD            | IMD3                |
|                                                          | n78     | 3310                       | 10                   | 50                     | 3310                       | N/A         | TDD            | N/A                 |
|                                                          | n41     | 2565                       | 10                   | 50                     | 2565                       | N/A         | TDD            | N/A                 |
|                                                          | n70     | N/A                        | 5                    | N/A                    | 2000                       | 8.6         | FDD            | IMD4                |
|                                                          | n78     | 3565                       | 10                   | 50                     | 3565                       | N/A         | TDD            | N/A                 |
|                                                          | n41     | N/A                        | 10                   | N/A                    | 2480                       | 5.3         | TDD            | IMD5                |
|                                                          | n70     | 1700                       | 5                    | 25                     | 2000                       | N/A         | FDD            | N/A                 |
|                                                          | n78     | 3790                       | 10                   | 50                     | 3790                       | N/A         | TDD            | N/A                 |
|                                                          | n41     | 2545                       | 10                   | 50                     | 2545                       | N/A         | FDD            | N/A                 |
|                                                          | n70     | 1700                       | 5                    | 25                     | 2000                       | N/A         | FDD            | N/A                 |
| CA_n41-n71-n77                                           | n78     | N/A                        | 10                   | N/A                    | 3390                       | 16.1        | TDD            | IMD3                |
|                                                          | n41     | 2615                       | 5                    | 25                     | 2615                       | N/A         | TDD            | N/A                 |
|                                                          | n71     | 693                        | 5                    | 25                     | 647                        | N/A         | FDD            | N/A                 |
|                                                          | n77     | N/A                        | 10                   | N/A                    | 3308                       | 29.1        | TDD            | IMD2 <sup>1,5</sup> |
|                                                          | n41     | 2564                       | 5                    | 25                     | 2564                       | N/A         | TDD            | N/A                 |
|                                                          | n71     | 693                        | 5                    | 25                     | 647                        | N/A         | FDD            | N/A                 |
|                                                          | n77     | N/A                        | 10                   | N/A                    | 3950                       | 16.3        | TDD            | IMD3 <sup>1</sup>   |
|                                                          | n41     | 2580                       | 5                    | 25                     | 2580                       | N/A         | TDD            | N/A                 |
|                                                          | n71     | 693                        | 5                    | 25                     | 647                        | N/A         | FDD            | N/A                 |
|                                                          | n77     | N/A                        | 10                   | N/A                    | 3774                       | 10.3        | TDD            | IMD4 <sup>1</sup>   |

| Band / Channel bandwidth / N <sub>RB</sub> / Duplex mode |         |                         |                |                     |                         |          |             | Source of IMD         |
|----------------------------------------------------------|---------|-------------------------|----------------|---------------------|-------------------------|----------|-------------|-----------------------|
| NR CA band combination                                   | NR band | UL F <sub>c</sub> (MHz) | UL/DL BW (MHz) | UL L <sub>CRB</sub> | DL F <sub>c</sub> (MHz) | MSD (dB) | Duplex mode |                       |
|                                                          | n41     | N/A                     | 5              | N/A                 | 2615                    | 28.7     | TDD         | IMD2 <sup>5</sup>     |
|                                                          | n71     | 693                     | 5              | 25                  | 647                     | N/A      | FDD         | N/A                   |
|                                                          | n77     | 3308                    | 10             | 50                  | 3308                    | N/A      | TDD         | N/A                   |
|                                                          | n41     | N/A                     | 5              | N/A                 | 2564                    | 15.5     | TDD         | IMD3                  |
|                                                          | n71     | 693                     | 5              | 25                  | 647                     | N/A      | FDD         | N/A                   |
|                                                          | n77     | 3950                    | 10             | 50                  | 3950                    | N/A      | TDD         | N/A                   |
|                                                          | 41      | 2680                    | 5              | 25                  | 2680                    | N/A      | TDD         | N/A                   |
|                                                          | n71     | N/A                     | 5              | N/A                 | 640                     | 30.8     | FDD         | IMD2 <sup>5</sup>     |
| CA_n41-n71-n78                                           | n77     | 3320                    | 10             | 50                  | 3320                    | N/A      | TDD         | N/A                   |
|                                                          | n41     | 2615                    | 5              | 25                  | 2615                    | N/A      | TDD         | N/A                   |
|                                                          | n71     | 693                     | 5              | 25                  | 647                     | N/A      | FDD         | N/A                   |
|                                                          | n78     | N/A                     | 10             | N/A                 | 3308                    | 29.1     | TDD         | IMD2 <sup>1</sup>     |
|                                                          | n41     | 2580                    | 5              | 25                  | 2580                    | N/A      | TDD         | N/A                   |
|                                                          | n71     | 693                     | 5              | 25                  | 647                     | N/A      | FDD         | N/A                   |
|                                                          | n77     | N/A                     | 10             | N/A                 | 3774                    | 10.3     | TDD         | IMD4 <sup>1</sup>     |
|                                                          | n41     | N/A                     | 5              | N/A                 | 2615                    | 28.7     | TDD         | IMD2                  |
|                                                          | n71     | 693                     | 5              | 25                  | 647                     | N/A      | FDD         | N/A                   |
|                                                          | n77     | 3308                    | 10             | 50                  | 3308                    | N/A      | TDD         | N/A                   |
|                                                          | 41      | 2642                    | 5              | 25                  | 2642                    | N/A      | TDD         | N/A                   |
|                                                          | n71     | N/A                     | 5              | N/A                 | 798                     | 30.8     | FDD         | IMD2                  |
| CA_n48-n66-n70                                           | n77     | 3440                    | 10             | 50                  | 3440                    | N/A      | TDD         | N/A                   |
|                                                          | n48     | 3625                    | 10             | 50                  | 3625                    | N/A      | TDD         | N/A                   |
|                                                          | n66     | N/A                     | 5              | N/A                 | 2142.5                  | 2.8      | FDD         | IMD5                  |
|                                                          | n70     | 1702.5                  | 5              | 25                  | 2002.5                  | N/A      | FDD         | N/A                   |
|                                                          | n48     | 3645                    | 10             | 50                  | 3645                    | N/A      | TDD         | N/A                   |
|                                                          | n66     | 1762.5                  | 5              | 25                  | 2162.5                  | N/A      | FDD         | N/A                   |
| CA_n48-n66-n71                                           | n70     | N/A                     | 5              | N/A                 | 2002.5                  | 3.1      | FDD         | IMD5                  |
|                                                          | n48     | 3552.5                  | 10             | 50                  | 3552.5                  | N/A      | TDD         | N/A                   |
|                                                          | n66     | N/A                     | 5              | N/A                 | 2161.5                  | 14.4     | FDD         | IMD3                  |
|                                                          | n71     | 695.5                   | 5              | 25                  | 649.5                   | N/A      | FDD         | N/A                   |
|                                                          | n48     | N/A                     | 10             | N/A                 | 3695                    | 5.2      | TDD         | IMD4                  |
|                                                          | n66     | 1712.5                  | 5              | 25                  | 2112.5                  | N/A      | FDD         | N/A                   |
| CA_n48-n70-n71                                           | n71     | 665.5                   | 5              | 25                  | 619.5                   | N/A      | FDD         | N/A                   |
|                                                          | n48     | N/A                     | 10             | N/A                 | 3694                    | 9        | TDD         | IMD4 <sup>1</sup>     |
|                                                          | n70     | 1697.5                  | 5              | 25                  | 1997.5                  | N/A      | FDD         | N/A                   |
|                                                          | n71     | 665.5                   | 5              | 25                  | 619.5                   | N/A      | FDD         | N/A                   |
| CA_n66-n70-n78                                           | n66     | 1760                    | 5              | 25                  | 2160                    | N/A      | FDD         | N/A                   |
|                                                          | n70     | N/A                     | 5              | N/A                 | 2000                    | 32.1     | FDD         | IMD2                  |
|                                                          | n78     | 3760                    | 10             | 50                  | 3760                    | N/A      | TDD         | N/A                   |
|                                                          | n66     | 1770                    | 5              | 25                  | 2170                    | N/A      | FDD         | N/A                   |
|                                                          | n70     | N/A                     | 5              | N/A                 | 2000                    | 9.1      | FDD         | IMD4                  |
|                                                          | n78     | 3310                    | 10             | 50                  | 3310                    | N/A      | TDD         | N/A                   |
|                                                          | n66     | 1760                    | 5              | 25                  | 2160                    | N/A      | FDD         | N/A                   |
|                                                          | n70     | N/A                     | 5              | N/A                 | 2000                    | 2.1      | FDD         | IMD5                  |
|                                                          | n78     | 3640                    | 10             | 50                  | 3640                    | N/A      | TDD         | N/A                   |
|                                                          | n66     | N/A                     | 5              | N/A                 | 2160                    | 5.0      | FDD         | IMD5                  |
|                                                          | n70     | 1700                    | 5              | 25                  | 2000                    | N/A      | FDD         | N/A                   |
|                                                          | n78     | 3630                    | 10             | 50                  | 3630                    | N/A      | TDD         | N/A                   |
| CA_n66-n71-n77                                           | n66     | 1720                    | 5              | 25                  | 2120                    | N/A      | FDD         | N/A                   |
|                                                          | n71     | 668                     | 5              | 25                  | 622                     | N/A      | FDD         | N/A                   |
|                                                          | n77     | N/A                     | 10             | N/A                 | 4108                    | 15.9     | TDD         | IMD3 <sup>1,2,5</sup> |
|                                                          | n66     | N/A                     | 5              | N/A                 | 2150                    | 15.5     | FDD         | IMD3 <sup>2</sup>     |
|                                                          | n71     | 690                     | 5              | 25                  | 644                     | N/A      | FDD         | N/A                   |
|                                                          | n77     | 3530                    | 10             | 50                  | 3530                    | N/A      | TDD         | N/A                   |
|                                                          | n66     | 1720                    | 5              | 25                  | 2120                    | N/A      | FDD         | N/A                   |
|                                                          | n71     | N/A                     | 5              | N/A                 | 640                     | 15.3     | FDD         | IMD3 <sup>5</sup>     |
| CA_n66-n71-n78                                           | n77     | 4080                    | 10             | 50                  | 4080                    | N/A      | TDD         | N/A                   |
|                                                          | n66     | 1720                    | 5              | 25                  | 2120                    | N/A      | FDD         | N/A                   |
|                                                          | n71     | 668                     | 5              | 25                  | 622                     | N/A      | FDD         | N/A                   |
|                                                          | n78     | N/A                     | 10             | N/A                 | 3724                    | 9        | TDD         | IMD4 <sup>1</sup>     |

| Band / Channel bandwidth / N <sub>RB</sub> / Duplex mode                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |         |                         |                |                     |                         |          |             | Source of IMD |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------------------------|----------------|---------------------|-------------------------|----------|-------------|---------------|
| NR CA band combination                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | NR band | UL F <sub>c</sub> (MHz) | UL/DL BW (MHz) | UL L <sub>CRB</sub> | DL F <sub>c</sub> (MHz) | MSD (dB) | Duplex mode |               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | n66     | N/A                     | 5              | N/A                 | 2160                    | 15.5     | FDD         | IMD3          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | n71     | 693                     | 5              | 25                  | 647                     | N/A      | FDD         | N/A           |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | n78     | 3546                    | 10             | 50                  | 3546                    | N/A      | TDD         | N/A           |
| <p>NOTE 1: This band is subject to IMD5 also which MSD is not specified.</p> <p>NOTE 2: This band is subject to IMD4 also which MSD is not specified.</p> <p>NOTE 3: The requirements only apply for UEs supporting inter-band carrier aggregation with simultaneous Rx/Tx capability. Simultaneous Rx/Tx capability does not apply for UEs supporting band n78 with a n77 implementation.</p> <p>NOTE 4: This band is subject to IMD3 also which MSD is not specified.</p> <p>NOTE 5: For a UE which supports this band combination only when the Band n77 frequency range restriction defined in NOTE 12 of Table 5.2-1 applies, the MSD test point(s) cannot be verified for the band combination and the test point(s) can be skipped.</p> <p>NOTE 6: This band is subjected to 2<sup>nd</sup> order IMD but is not expected for the operating frequency range of n77 within USA (3450 – 3550 MHz, 3700 – 3980 MHz).</p> <p>NOTE 7: The MSD test points cannot be verified for the band combination in US due to the Band n77 frequency range restriction.</p> <p>NOTE 8: Both of the transmitters shall be set min(+20 dBm, P<sub>C<sub>MAX</sub>, L, f, c</sub>) as defined in clause 6.2A.4</p> |         |                         |                |                     |                         |          |             |               |

**Table 7.3A.5-2a: 3DL/2UL interband Reference sensitivity QPSK P<sub>REFSENS</sub> and uplink/downlink configurations for PC2 CA**

| Band / Channel bandwidth / N <sub>RB</sub> / Duplex mode |         |                         |                |                     |                         |          |             | Source of IMD       |
|----------------------------------------------------------|---------|-------------------------|----------------|---------------------|-------------------------|----------|-------------|---------------------|
| NR CA band combination                                   | NR band | UL F <sub>c</sub> (MHz) | UL/DL BW (MHz) | UL L <sub>CRB</sub> | DL F <sub>c</sub> (MHz) | MSD (dB) | Duplex mode |                     |
| CA_n1-n3-n78                                             | n1      | 1950                    | 5              | 25                  | 2140                    | N/A      | FDD         | N/A                 |
|                                                          | n3      | N/A                     | 5              | N/A                 | 1830                    | 33.9     | FDD         | IMD2                |
|                                                          | n78     | 3780                    | 10             | 52                  | 3780                    | N/A      | TDD         | N/A                 |
| CA_n2-n5-n77                                             | n2      | 1907.5                  | 5              | 25                  | 1987.5                  | N/A      | FDD         | N/A                 |
|                                                          | n5      | N/A                     | 5              | N/A                 | 887.5                   | 13.6     | FDD         | IMD5 <sup>5</sup>   |
|                                                          | n77     | 3305                    | 10             | 50                  | 3305                    | N/A      | TDD         | N/A                 |
|                                                          | n2      | 1907                    | 5              | N/A                 | 1987                    | 24.8     | FDD         | IMD3 <sup>5</sup>   |
|                                                          | n5      | 846.5                   | 5              | 25                  | 891.5                   | N/A      | FDD         | N/A                 |
|                                                          | n77     | 3680                    | 10             | 50                  | 3680                    | N/A      | TDD         | N/A                 |
|                                                          | n2      | N/A                     | 5              | N/A                 | 1960                    | 24.8     | FDD         | IMD3 <sup>2,5</sup> |
| CA_n2-n12-n77                                            | n12     | 707.5                   | 5              | 25                  | 737.5                   | N/A      | FDD         | N/A                 |
|                                                          | n77     | 3375                    | 10             | 50                  | 3375                    | N/A      | TDD         | N/A                 |
|                                                          | n2      | N/A                     | 5              | N/A                 | 1954                    | 24.8     | FDD         | IMD3                |
| CA_n2-n14-n77                                            | n14     | 793                     | 5              | 25                  | 763                     | N/A      | FDD         | N/A                 |
|                                                          | n77     | 3540                    | 10             | 50                  | 3540                    | N/A      | TDD         | N/A                 |
|                                                          | n2      | N/A                     | 5              | N/A                 | 1986                    | 19.3     | FDD         | IMD4 <sup>5</sup>   |
| CA_n2-n30-n77                                            | n30     | 2312                    | 5              | 25                  | 2357                    | N/A      | FDD         | N/A                 |
|                                                          | n77     | 3305                    | 10             | 50                  | 3305                    | N/A      | TDD         | N/A                 |
|                                                          | n2      | 1905                    | 5              | 25                  | 1985                    | N/A      | FDD         | N/A                 |
|                                                          | n30     | N/A                     | 5              | N/A                 | 2354                    | 22.2     | FDD         | IMD4 <sup>5</sup>   |
|                                                          | n77     | 3361                    | 10             | 50                  | 3361                    | N/A      | TDD         | N/A                 |
|                                                          | n2      | 1860                    | 5              | 25                  | 1940                    | N/A      | FDD         | N/A                 |
|                                                          | n30     | N/A                     | 5              | N/A                 | 2354                    | 12.9     | FDD         | IMD5                |
|                                                          | n77     | 3967                    | 10             | 50                  | 3967                    | N/A      | TDD         | N/A                 |
|                                                          | n2      | 1855                    | 5              | 25                  | 1935                    | N/A      | FDD         | N/A                 |
|                                                          | n66     | N/A                     | 5              | N/A                 | 2115                    | 34.7     | FDD         | IMD2 <sup>1,2</sup> |
| CA_n2-n66-n77                                            | n77     | 3970                    | 10             | 50                  | 3970                    | N/A      | TDD         | N/A                 |
|                                                          | n2      | N/A                     | 5              | N/A                 | 1960                    | 37.6     | FDD         | IMD2 <sup>1,2</sup> |
|                                                          | n66     | 1760                    | 5              | 25                  | 2160                    | N/A      | FDD         | N/A                 |
|                                                          | n77     | 3720                    | 10             | 50                  | 3720                    | N/A      | TDD         | N/A                 |
|                                                          | n5      | N/A                     | 5              | N/A                 | 879                     | 35.2     | FDD         | IMD2 <sup>1</sup>   |
| CA_n5-n7-n78                                             | n7      | 2550                    | 5              | 25                  | 2670                    | N/A      | FDD         | N/A                 |
|                                                          | n78     | 3429                    | 10             | 50                  | 3429                    | N/A      | TDD         | N/A                 |
|                                                          | n5      | 844                     | 5              | 25                  | 889                     | N/A      | FDD         | N/A                 |
|                                                          |         |                         |                |                     |                         |          |             |                     |

| Band / Channel bandwidth / N <sub>RB</sub> / Duplex mode |         |                         |                |                     |                         |          |             | Source of IMD     |
|----------------------------------------------------------|---------|-------------------------|----------------|---------------------|-------------------------|----------|-------------|-------------------|
| NR CA band combination                                   | NR band | UL F <sub>c</sub> (MHz) | UL/DL BW (MHz) | UL L <sub>CRB</sub> | DL F <sub>c</sub> (MHz) | MSD (dB) | Duplex mode |                   |
|                                                          | n7      | N/A                     | 5              | N/A                 | 2645                    | 35.1     | FDD         | IMD2              |
|                                                          | n78     | 3489                    | 10             | 50                  | 3489                    | N/A      | TDD         | N/A               |
| CA_n5-n12-n77                                            | n5      | N/A                     | 5              | N/A                 | 880                     | 14.0     | FDD         | IMD5              |
|                                                          | n12     | 707.5                   | 5              | 25                  | 737.5                   | N/A      | FDD         | N/A               |
|                                                          | n77     | 3710                    | 10             | 50                  | 3710                    | N/A      | TDD         | N/A               |
|                                                          | n5      | 835                     | 5              | 25                  | 880                     | N/A      | FDD         | N/A               |
|                                                          | n12     | N/A                     | 5              | N/A                 | 740                     | 14.9     | FDD         | IMD5 <sup>5</sup> |
|                                                          | n77     | 4080                    | 10             | 50                  | 4080                    | N/A      | TDD         | N/A               |
| CA_n5-n14-n77 <sup>5</sup>                               | n5      | N/A                     | 5              | N/A                 | 880                     | 14.0     | FDD         | IMD5              |
|                                                          | n14     | 793                     | 5              | 25                  | 763                     | N/A      | FDD         | N/A               |
|                                                          | n77     | 4052                    | 10             | 50                  | 4052                    | N/A      | TDD         | N/A               |
|                                                          | n5      | 846.5                   | 5              | 25                  | 891.5                   | N/A      | FDD         | N/A               |
|                                                          | n14     | N/A                     | 5              | N/A                 | 765.5                   | 20.3     | FDD         | IMD4 <sup>1</sup> |
|                                                          | n77     | 3305                    | 10             | 50                  | 3305                    | N/A      | TDD         | N/A               |
| CA_n5-n29-n77                                            | n5      | 835                     | 5              | 25                  | 880                     | N/A      | FDD         | N/A               |
|                                                          | n29     | N/A                     | 5              | N/A                 | 722                     | 14.9     | FDD         | IMD5 <sup>5</sup> |
|                                                          | n77     | 4062                    | 10             | 50                  | 4062                    | N/A      | TDD         | N/A               |
| CA_n5-n30-n77                                            | n5      | N/A                     | 5              | N/A                 | 880                     | 23.5     | FDD         | IMD3 <sup>1</sup> |
|                                                          | n30     | 2310                    | 5              | 25                  | 2355                    | N/A      | FDD         | N/A               |
|                                                          | n77     | 3740                    | 10             | 50                  | 3740                    | N/A      | TDD         | N/A               |
|                                                          | n5      | 835                     | 5              | 25                  | 880                     | N/A      | FDD         | N/A               |
|                                                          | n30     | N/A                     | 5              | N/A                 | 2355                    | 21.4     | FDD         | IMD3 <sup>5</sup> |
|                                                          | n77     | 4025                    | 10             | 50                  | 4025                    | N/A      | TDD         | N/A               |
| CA_n5-n66-n77                                            | n5      | 826.5                   | 5              | 25                  | 871.5                   | N/A      | FDD         | N/A               |
|                                                          | n66     | N/A                     | 5              | N/A                 | 2142                    | 22.2     | FDD         | IMD3              |
|                                                          | n77     | 3795                    | 10             | 50                  | 3795                    | N/A      | TDD         | N/A               |
| CA_n7-n28-n78                                            | n7      | 2567.5                  | 5              | 25                  | 2687.5                  | N/A      | FDD         | N/A               |
|                                                          | n28     | N/A                     | 5              | N/A                 | 782.5                   | 33.8     | FDD         | IMD2 <sup>1</sup> |
|                                                          | n78     | 3350                    | 10             | 50                  | 3350                    | N/A      | TDD         | N/A               |
|                                                          | n7      | N/A                     | 5              | N/A                 | 2650                    | 35.5     | FDD         | IMD2              |
|                                                          | n28     | 740                     | 5              | 25                  | 795                     | N/A      | FDD         | N/A               |
|                                                          | n78     | 3390                    | 10             | 50                  | 3390                    | N/A      | TDD         | N/A               |
| CA_n12-n30-n77                                           | n12     | N/A                     | 5              | N/A                 | 740                     | 23.5     | FDD         | IMD3 <sup>1</sup> |
|                                                          | n30     | 2310                    | 5              | 25                  | 2355                    | N/A      | FDD         | N/A               |
|                                                          | n77     | 3880                    | 10             | 50                  | 3880                    | N/A      | TDD         | N/A               |
|                                                          | n12     | 707.5                   | 5              | 25                  | 737.5                   | N/A      | FDD         | N/A               |
|                                                          | n30     | N/A                     | 5              | N/A                 | 2355                    | 21.4     | FDD         | IMD3              |
|                                                          | n77     | 3770                    | 10             | 50                  | 3770                    | N/A      | TDD         | N/A               |
| CA_n12-n66-n77                                           | n12     | N/A                     | 5              | N/A                 | 740                     | 23.5     | FDD         | IMD3 <sup>5</sup> |
|                                                          | n66     | 1720                    | 5              | 25                  | 2120                    | N/A      | FDD         | N/A               |
|                                                          | n77     | 4180                    | 10             | 50                  | 4180                    | N/A      | TDD         | N/A               |
|                                                          | n12     | 707                     | 5              | 25                  | 737                     | N/A      | FDD         | N/A               |
|                                                          | n66     | N/A                     | 5              | N/A                 | 2126                    | 21.4     | FDD         | IMD3              |
|                                                          | n77     | 3540                    | 10             | 50                  | 3540                    | N/A      | TDD         | N/A               |
| CA_n14-n30-n77                                           | n14     | N/A                     | 5              | N/A                 | 763                     | 23.5     | FDD         | IMD3 <sup>1</sup> |
|                                                          | n30     | 2310                    | 5              | 25                  | 2355                    | N/A      | FDD         | N/A               |
|                                                          | n77     | 3857                    | 10             | 50                  | 3857                    | N/A      | TDD         | N/A               |
|                                                          | n14     | 793                     | 5              | 25                  | 763                     | N/A      | FDD         | N/A               |
|                                                          | n30     | N/A                     | 5              | N/A                 | 2355                    | 21.4     | FDD         | IMD3              |
|                                                          | n77     | 3941                    | 10             | 50                  | 3941                    | N/A      | TDD         | N/A               |
| CA_n14-n66-n77                                           | n14     | N/A                     | 5              | N/A                 | 763                     | 23.5     | FDD         | IMD3 <sup>5</sup> |
|                                                          | n66     | 1712.5                  | 5              | 25                  | 2112.5                  | N/A      | FDD         | N/A               |
|                                                          | n77     | 4188                    | 10             | 50                  | 4188                    | N/A      | TDD         | N/A               |
|                                                          | n14     | 793                     | 5              | 25                  | 763                     | N/A      | FDD         | N/A               |
|                                                          | n66     | N/A                     | 5              | N/A                 | 2155                    | 21.4     | FDD         | IMD3              |
|                                                          | n77     | 3741                    | 10             | 50                  | 3741                    | N/A      | TDD         | N/A               |
| CA_n29-n30-n77                                           | n29     | N/A                     | 5              | N/A                 | 722                     | 23.5     | FDD         | IMD3 <sup>1</sup> |
|                                                          | n30     | 2310                    | 5              | 25                  | 2355                    | N/A      | FDD         | N/A               |
|                                                          | n77     | 3898                    | 10             | 50                  | 3898                    | N/A      | TDD         | N/A               |
| CA_n29-n66-n77                                           | n29     | N/A                     | 5              | N/A                 | 722                     | 23.5     | FDD         | IMD3 <sup>5</sup> |

| Band / Channel bandwidth / N <sub>RB</sub> / Duplex mode                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |         |                         |                |                     |                         |          |             | Source of IMD     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------------------------|----------------|---------------------|-------------------------|----------|-------------|-------------------|
| NR CA band combination                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | NR band | UL F <sub>c</sub> (MHz) | UL/DL BW (MHz) | UL L <sub>CRB</sub> | DL F <sub>c</sub> (MHz) | MSD (dB) | Duplex mode |                   |
| CA_n30-n66-n77                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | n66     | 1734                    | 5              | 25                  | 2134                    | N/A      | FDD         | N/A               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | n77     | 4190                    | 10             | 50                  | 4190                    | N/A      | TDD         | N/A               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | n30     | N/A                     | 5              | N/A                 | 2355                    | 34.2     | FDD         | IMD2 <sup>5</sup> |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | n66     | 1745                    | 5              | 25                  | 2145                    | N/A      | FDD         | N/A               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | n77     | 4100                    | 10             | 50                  | 4100                    | N/A      | TDD         | N/A               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | n30     | N/A                     | 5              | N/A                 | 2355                    | 12.9     | FDD         | IMD5              |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | n66     | 1735                    | 5              | 25                  | 2135                    | N/A      | FDD         | N/A               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | n77     | 3780                    | 10             | 50                  | 3780                    | N/A      | TDD         | N/A               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | n30     | 2310                    | 5              | 25                  | 2355                    | N/A      | FDD         | N/A               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | n66     | N/A                     | 5              | N/A                 | 2160                    | 19.2     | FDD         | IMD4 <sup>5</sup> |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | n77     | 3390                    | 10             | 50                  | 3390                    | N/A      | TDD         | N/A               |
| <p>NOTE 1: This band is subject to IMD5 also which MSD is not specified.</p> <p>NOTE 2: This band is subject to IMD4 also which MSD is not specified.</p> <p>NOTE 3: The requirements only apply for UEs supporting inter-band carrier aggregation with simultaneous Rx/Tx capability. Simultaneous Rx/Tx capability does not apply for UEs supporting band n78 with a n77 implementation.</p> <p>NOTE 4: This band is subject to IMD3 also which MSD is not specified.</p> <p>NOTE 5: For a UE which supports this band combination only when the Band n77 frequency range restriction defined in NOTE 12 of Table 5.2-1 applies, the MSD test point(s) cannot be verified for the band combination and the test point(s) can be skipped.</p> <p>NOTE 6: Both of the transmitters shall be set min(+23 dBm, P<sub>C<sub>MAX</sub> L,f,0</sub>) as defined in clause 6.2A.4</p> |         |                         |                |                     |                         |          |             |                   |

### 7.3A.6 Reference sensitivity exceptions due to cross band isolation for CA

Sensitivity degradation is allowed for a band if it is impacted by UL of another band part which belongs to NR band of the same NR CA configuration due to cross band isolation issues. The reference sensitivity degradation for the victim band due to cross band isolation is specified only for the specific uplink and downlink test points specified in Table 7.3A.6-1 for either PC3 and PC2 NR CA from a PC3 aggressor NR UL band, and for PC2 NR CA, in Table 7.3A.6-1a from a PC2 aggressor NR UL band, and in Table 7.3A.6-1b from a PC1.5 aggressor NR single band uplink

In Tables 7.3A.6-1, 7.3A.6-1a and 7.3A.6-1b the following terminology is used to define the source of cross-band isolation interference:

- “ACLR1” indicates that the first adjacent channel of the aggressor UL band falls into the Rx channel of victim band.
- “ACLR2” indicates that the second adjacent channel of the aggressor UL band falls into the Rx channel of victim band.
- “>ACLR2” indicates that neither the first, nor the second adjacent channel of the aggressor UL band falls into the Rx channel of victim band.

**Table 7.3A.6-1: Reference sensitivity exceptions (MSD) and uplink/downlink configurations due to cross band isolation from a PC3 aggressor NR UL band for NR CA FR1**

| UL band | DL band | UL F <sub>c</sub> | UL BW | SCS of UL band | UL RB Allocation  | DL F <sub>c</sub> | DL BW | MSD  | Cross-band Interference source |
|---------|---------|-------------------|-------|----------------|-------------------|-------------------|-------|------|--------------------------------|
|         |         | (MHz)             | (MHz) | (kHz)          | L <sub>CRB</sub>  | (MHz)             | (MHz) | (dB) |                                |
| n1      | n3      | 1922.5            | 5     | 15             | 25 (RBstart=0)    | 1877.5            | 5     | 3    | >ACLR2                         |
| n1      | n3      | 1945              | 50    | 15             | 128 (RBstart=0)   | 1877.5            | 5     | 19.7 | ACLR1                          |
| n1      | n38     | 1955              | 50    | 15             | 128 (RBstart=142) | 2572.5            | 5     | 2.9  | >ACLR2                         |
| n1      | n38     | 1955              | 50    | 15             | 128 (RBstart=142) | 2590              | 40    | 2.9  | >ACLR2                         |
| n1      | n40     | 1970              | 20    | 15             | 100 (RBstart=6)   | 2302.5            | 5     | 6.6  | >ACLR2                         |
| n1      | n41     | 1955              | 50    | 15             | 128 (RBstart=142) | 2501              | 10    | 6.1  | >ACLR2                         |

| UL band          | DL band          | UL F <sub>c</sub> | UL BW | SCS of UL band | UL RB Allocation | DL F <sub>c</sub> | DL BW | MSD  | Cross-band Interference source |
|------------------|------------------|-------------------|-------|----------------|------------------|-------------------|-------|------|--------------------------------|
|                  |                  | (MHz)             | (MHz) | (kHz)          | L <sub>CRB</sub> | (MHz)             | (MHz) | (dB) |                                |
| n1               | n41              | 1970              | 20    | 15             | 100 (RBstart=6)  | 2546              | 100   | 0.7  | >ACLR2                         |
| n3               | n41              | 1765              | 40    | 15             | 50 (RBstart=166) | 2501              | 10    | 0.7  | >ACLR2                         |
| n3               | n41              | 1765              | 40    | 15             | 50 (RBstart=166) | 2546              | 100   | 0.7  | >ACLR2                         |
| n3               | n74              | 1712.5            | 5     | 15             | 25 (RBstart=0)   | 1515.5            | 5     | 2.6  | >ACLR2                         |
| n5               | n28              | 834               | 20    | 15             | 20 (RBstart=0)   | 800.5             | 5     | 17.5 | ACLR2                          |
| n7               | n3               | 2525              | 50    | 15             | 45 (RBstart=0)   | 1877.5            | 5     | 0.6  | >ACLR2                         |
| n7               | n40              | 2525              | 50    | 15             | 45 (RBstart=0)   | 2397.5            | 5     | 3.7  | >ACLR2                         |
| n18              | n28 <sup>5</sup> | 822.5             | 15    | 15             | 25 (RBstart=0)   | 800.5             | 5     | 31.3 | ACLR1                          |
| n18              | n28              | 822.5             | 15    | 15             | 25 (RBstart=0)   | 785.5             | 5     | 12.7 | ACLR2                          |
| n30              | n66              | 2310              | 10    | 15             | 20 (RBstart=0)   | 2197.5            | 5     | 8.3  | >ACLR2                         |
| n34              | n3               | 2017.5            | 15    | 15             | 75 (RBstart=0)   | 1877.5            | 5     | 3    | >ACLR2                         |
| n38              | n1               | 2590              | 40    | 15             | 216 (RBstart=0)  | 2167.5            | 5     | 1.9  | >ACLR2                         |
| n38              | n2               | 2590              | 40    | 15             | 216 (RBstart=0)  | 1987.5            | 5     | 0.6  | >ACLR2                         |
| n38              | n25              | 2590              | 40    | 15             | 216 (RBstart=0)  | 1992.5            | 5     | 0.6  | >ACLR2                         |
| n38              | n78              | 2600              | 40    | 15             | 216 (RBstart=0)  | 3305              | 10    | 8.3  | >ACLR2                         |
| n38              | n66              | 2590              | 40    | 15             | 216 (RBstart=0)  | 2197.5            | 5     | 1.9  | >ACLR2                         |
| n40              | n1               | 2340              | 80    | 30             | 216 (RBstart=0)  | 2167.5            | 5     | 18.1 | ACLR2                          |
| n40              | n7               | 2350              | 100   | 30             | 270 (RBstart=3)  | 2622.5            | 5     | 21.9 | >ACLR2                         |
| n40              | n7               | 2350              | 100   | 30             | 270 (RBstart=3)  | 2645              | 50    | 13.5 | >ACLR2                         |
| n41              | n1               | 2546              | 100   | 30             | 270 (RBstart=0)  | 2167.5            | 5     | 18.1 | >ACLR2                         |
| n41              | n3               | 2546              | 100   | 30             | 270 (RBstart=0)  | 1877.5            | 5     | 0.6  | >ACLR2                         |
| n41              | n25              | 2546              | 100   | 30             | 270 (RBstart=0)  | 1992.5            | 5     | 0.6  | >ACLR2                         |
| n41              | n48              | 2680              | 100   | 30             | 270 (RBstart=3)  | 3552.5            | 5     | 8.3  | >ACLR2                         |
| n41 <sup>1</sup> | n66              | 2546              | 100   | 30             | 270 (RBstart=0)  | 2197.5            | 5     | 10.5 | >ACLR2                         |
| n41              | n70              | 2546              | 100   | 30             | 270 (RBstart=0)  | 2017.5            | 5     | 0.6  | >ACLR2                         |
| n41              | n77              | 2640              | 100   | 30             | 270 (RBstart=3)  | 3305              | 10    | 8.3  | >ACLR2                         |
| n41              | n78              | 2640              | 100   | 30             | 270 (RBstart=3)  | 3305              | 10    | 8.3  | >ACLR2                         |
| n46              | n48              | 5190              | 80    | 30             | 216 (RBstart=0)  | 3697.5            | 5     | 13.3 | >ACLR2                         |
| n46              | n48              | 5190              | 80    | 30             | 216 (RBstart=0)  | 3650              | 100   | 6.2  | >ACLR2                         |
| n46              | n78              | 5190              | 80    | 30             | 216 (RBstart=0)  | 3795              | 10    | 10.4 | >ACLR2                         |
| n46              | n78              | 5190              | 80    | 30             | 216 (RBstart=0)  | 3750              | 100   | 5.1  | >ACLR2                         |
| n48              | n41 <sup>1</sup> | 3570              | 40    | 15             | 216 (RBstart=0)  | 2685              | 10    | 4.5  | >ACLR2                         |
| n48              | n41 <sup>1</sup> | 3570              | 40    | 15             | 216 (RBstart=0)  | 2640              | 100   | 4.5  | >ACLR2                         |
| n48              | n46              | 3680              | 40    | 15             | 216 (RBstart=0)  | 5160              | 20    | 15.7 | >ACLR2                         |
| n48              | n96              | 3680              | 40    | 15             | 216 (RBstart=0)  | 5935              | 20    | 15.7 | >ACLR2                         |
| n66              | n2               | 1760              | 40    | 15             | 216 (RBstart=0)  | 1932.5            | 5     | 1.2  | >ACLR2                         |
| n66              | n25              | 1760              | 40    | 15             | 216 (RBstart=0)  | 1932.5            | 5     | 1.2  | >ACLR2                         |
| n71              | n29              | 688               | 20    | 15             | 20 (RBstart=86)  | 719.5             | 5     | 17.5 | ACLR2                          |
| n77              | n7               | 3350              | 100   | 30             | 270 (RBstart=0)  | 2687.5            | 5     | 4.5  | >ACLR2                         |
| n77              | n40 <sup>1</sup> | 3350              | 100   | 30             | 270 (RBstart=0)  | 2395              | 10    | 4.5  | >ACLR2                         |
| n77              | n40 <sup>1</sup> | 3350              | 100   | 30             | 270 (RBstart=0)  | 2350              | 100   | 4.5  | >ACLR2                         |

| UL band                                                                                                                                                                                                                       | DL band          | UL F <sub>c</sub> | UL BW | SCS of UL band | UL RB Allocation | DL F <sub>c</sub> | DL BW | MSD  | Cross-band Interference source |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------------|-------|----------------|------------------|-------------------|-------|------|--------------------------------|
|                                                                                                                                                                                                                               |                  | (MHz)             | (MHz) | (kHz)          | L <sub>CRB</sub> | (MHz)             | (MHz) | (dB) |                                |
| n77                                                                                                                                                                                                                           | n41 <sup>1</sup> | 3350              | 100   | 30             | 270 (RBstart=0)  | 2685              | 10    | 4.5  | >ACLR2                         |
| n77                                                                                                                                                                                                                           | n41 <sup>1</sup> | 3350              | 100   | 30             | 270 (RBstart=0)  | 2640              | 100   | 4.5  | >ACLR2                         |
| n78                                                                                                                                                                                                                           | n7 <sup>1</sup>  | 3350              | 100   | 30             | 270 (RBstart=0)  | 2687.5            | 5     | 4.5  | >ACLR2                         |
| n78                                                                                                                                                                                                                           | n38              | 3350              | 100   | 30             | 270 (RBstart=0)  | 2617.5            | 5     | 3.3  | >ACLR2                         |
| n78                                                                                                                                                                                                                           | n38              | 3350              | 100   | 30             | 270 (RBstart=0)  | 2600              | 40    | 3.3  | >ACLR2                         |
| n78                                                                                                                                                                                                                           | n40 <sup>1</sup> | 3350              | 100   | 30             | 270 (RBstart=0)  | 2397.5            | 5     | 4.5  | >ACLR2                         |
| n78                                                                                                                                                                                                                           | n40 <sup>1</sup> | 3350              | 100   | 30             | 270 (RBstart=0)  | 2350              | 100   | 4.5  | >ACLR2                         |
| n78                                                                                                                                                                                                                           | n41 <sup>1</sup> | 3350              | 100   | 30             | 270 (RBstart=0)  | 2685              | 10    | 4.5  | >ACLR2                         |
| n78                                                                                                                                                                                                                           | n41 <sup>1</sup> | 3350              | 100   | 30             | 270 (RBstart=0)  | 2640              | 100   | 4.5  | >ACLR2                         |
| n78                                                                                                                                                                                                                           | n46              | 3750              | 100   | 30             | 270 (RBstart=3)  | 5160              | 20    | 13.5 | >ACLR2                         |
| n78 <sup>3</sup>                                                                                                                                                                                                              | n79              | 3750              | 100   | 30             | 270 (RBstart=3)  | 4405              | 10    | 2    | >ACLR2                         |
| n78 <sup>3</sup>                                                                                                                                                                                                              | n79              | 3750              | 100   | 30             | 270 (RBstart=3)  | 4450              | 100   | 2    | >ACLR2                         |
| n79                                                                                                                                                                                                                           | n78 <sup>3</sup> | 4450              | 100   | 30             | 270 (RBstart=0)  | 3795              | 10    | 2.6  | >ACLR2                         |
| n79                                                                                                                                                                                                                           | n78 <sup>3</sup> | 4450              | 100   | 30             | 270 (RBstart=0)  | 3750              | 100   | 2.6  | >ACLR2                         |
| n96                                                                                                                                                                                                                           | n48              | 5965              | 80    | 30             | 216 (RBstart=0)  | 3697.5            | 5     | 13.3 | >ACLR2                         |
| n96                                                                                                                                                                                                                           | n48              | 5965              | 80    | 30             | 216 (RBstart=0)  | 3650              | 100   | 6.2  | >ACLR2                         |
| NOTE 1: Applicable only when harmonic mixing MSD for this combination is not applied.                                                                                                                                         |                  |                   |       |                |                  |                   |       |      |                                |
| NOTE 2: Void                                                                                                                                                                                                                  |                  |                   |       |                |                  |                   |       |      |                                |
| NOTE 3: The requirements only apply for UEs supporting inter-band carrier aggregation with simultaneous Rx/Tx capability. Simultaneous Rx/Tx capability does not apply for UEs supporting band n78 with a n77 implementation. |                  |                   |       |                |                  |                   |       |      |                                |
| NOTE 4: Void                                                                                                                                                                                                                  |                  |                   |       |                |                  |                   |       |      |                                |
| NOTE 5: The MSD exceptions are applicable to the case that interference of UL band 3 <sup>rd</sup> order IMD product falls into the affected DL channels.                                                                     |                  |                   |       |                |                  |                   |       |      |                                |

**Table 7.3A.6-1a: Reference sensitivity exceptions (MSD) and uplink/downlink configurations due to cross band isolation from a PC2 aggressor NR UL band for NR CA FR1**

| UL band | DL band          | UL F <sub>c</sub> | UL BW | SCS of UL band | UL RB Allocation | DL F <sub>c</sub> | DL BW | MSD  | Cross-band Interference source |
|---------|------------------|-------------------|-------|----------------|------------------|-------------------|-------|------|--------------------------------|
|         |                  | (MHz)             | (MHz) | (kHz)          | L <sub>CRB</sub> | (MHz)             | (MHz) | (dB) |                                |
| n41     | n3               | 2546              | 100   | 30             | 270 (RBstart=0)  | 1877.5            | 5     | 2.3  | >ACLR2                         |
| n41     | n25              | 2546              | 100   | 30             | 270 (RBstart=0)  | 1992.5            | 5     | 1.6  | >ACLR2                         |
| n41     | n66              | 2521              | 50    | 30             | 128 (RBstart=0)  | 2197.5            | 5     | 5.4  | >ACLR2                         |
| n41     | n77              | 2640              | 100   | 30             | 270 (RBstart=3)  | 3305              | 10    | 10.5 | >ACLR2                         |
| n41     | n79              | 2640              | 100   | 30             | 270 (RBstart=3)  | 4405              | 10    | 3.1  | >ACLR2                         |
| n77     | n2               | 3350              | 100   | 30             | 270 (RBstart=0)  | 1987.5            | 5     | 1.0  | >ACLR2                         |
| n77     | n25              | 3350              | 100   | 30             | 270 (RBstart=0)  | 1992.5            | 5     | 1.0  | >ACLR2                         |
| n77     | n30              | 3350              | 100   | 30             | 270 (RBstart=0)  | 2357.5            | 5     | 1.0  | >ACLR2                         |
| n77     | n41 <sup>1</sup> | 3350              | 100   | 30             | 270 (RBstart=0)  | 2685              | 10    | 6.5  | >ACLR2                         |
| n77     | n41 <sup>1</sup> | 3350              | 100   | 30             | 270 (RBstart=0)  | 2640              | 100   | 6.5  | >ACLR2                         |
| n77     | n66              | 3350              | 100   | 30             | 270 (RBstart=0)  | 2197.5            | 5     | 1.0  | >ACLR2                         |
| n78     | n7               | 3350              | 100   | 30             | 270 (RBstart=0)  | 2687.5            | 5     | 6.5  | >ACLR2                         |

|                                                                                       |     |      |     |    |                 |      |    |     |        |
|---------------------------------------------------------------------------------------|-----|------|-----|----|-----------------|------|----|-----|--------|
| n79                                                                                   | n41 | 4450 | 100 | 30 | 270 (RBstart=0) | 2685 | 10 | 3.5 | >ACLR2 |
| NOTE 1: Applicable only when harmonic mixing MSD for this combination is not applied. |     |      |     |    |                 |      |    |     |        |
| NOTE 2: Void.                                                                         |     |      |     |    |                 |      |    |     |        |

**Table 7.3A.6-1b: Reference sensitivity exceptions (MSD) and uplink/downlink configurations due to cross band isolation from a PC1.5 aggressor NR single UL band for DL NR CA FR1**

| UL band                                                                               | DL band          | UL F <sub>c</sub> | UL BW | SCS of UL band | UL RB Allocation | DL F <sub>c</sub> | DL BW | MSD  | Cross-band Interference source |
|---------------------------------------------------------------------------------------|------------------|-------------------|-------|----------------|------------------|-------------------|-------|------|--------------------------------|
|                                                                                       |                  | (MHz)             | (MHz) | (kHz)          | L <sub>CRB</sub> | (MHz)             | (MHz) | (dB) |                                |
| n41                                                                                   | n25              | 2546              | 100   | 30             | 270 (RBstart=0)  | 1992.5            | 5     | 2.8  | >ACLR2                         |
| n41                                                                                   | n66              | 2521              | 50    | 30             | 128 (RBstart=0)  | 2197.5            | 5     | 7.7  | >ACLR2                         |
| n41                                                                                   | n77              | 2640              | 100   | 30             | 270 (RBstart=3)  | 3305              | 10    | 13.3 | >ACLR2                         |
| n77                                                                                   | n2               | 3350              | 100   | 30             | 270 (RBstart=0)  | 1987.5            | 5     | 1.8  | >ACLR2                         |
| n77                                                                                   | n25              | 3350              | 100   | 30             | 270 (RBstart=0)  | 1992.5            | 5     | 1.8  | >ACLR2                         |
| n77                                                                                   | n30              | 3350              | 100   | 30             | 270 (RBstart=0)  | 2357.5            | 5     | 1.8  | >ACLR2                         |
| n77                                                                                   | n41 <sup>1</sup> | 3350              | 100   | 30             | 270 (RBstart=0)  | 2685              | 10    | 9.0  | >ACLR2                         |
| n77                                                                                   | n41 <sup>1</sup> | 3350              | 100   | 30             | 270 (RBstart=0)  | 2640              | 100   | 9.0  | >ACLR2                         |
| n77                                                                                   | n66              | 3350              | 100   | 30             | 270 (RBstart=0)  | 2197.5            | 5     | 1.8  | >ACLR2                         |
| NOTE 1: Applicable only when harmonic mixing MSD for this combination is not applied. |                  |                   |       |                |                  |                   |       |      |                                |
| NOTE 2: Void.                                                                         |                  |                   |       |                |                  |                   |       |      |                                |

**Table 7.3A.6-1c: Reference sensitivity exceptions (MSD) and uplink/downlink configurations due to cross band isolation from a power class 5 aggressor NR single UL band for DL NR CA FR1**

| UL band      | DL band | UL F <sub>c</sub> | UL BW | SCS of UL band | UL RB Allocation | DL F <sub>c</sub> | DL BW | MSD  | Cross-band Interference source |
|--------------|---------|-------------------|-------|----------------|------------------|-------------------|-------|------|--------------------------------|
|              |         | (MHz)             | (MHz) | (kHz)          | L <sub>CRB</sub> | (MHz)             | (MHz) | (dB) |                                |
| n46          | n48     | 5190              | 80    | 30             | 216 (RBstart=0)  | 3697.5            | 5     | 11   | >ACLR2                         |
| n46          | n48     | 5190              | 80    | 30             | 216 (RBstart=0)  | 3650              | 100   | 3.9  | >ACLR2                         |
| n46          | n78     | 5190              | 80    | 30             | 216 (RBstart=0)  | 3795              | 10    | 8.1  | >ACLR2                         |
| n46          | n78     | 5190              | 80    | 30             | 216 (RBstart=0)  | 3750              | 100   | 2.8  | >ACLR2                         |
| n96          | n48     | 5965              | 80    | 30             | 216 (RBstart=0)  | 3697.5            | 5     | 11   | >ACLR2                         |
| n96          | n48     | 5965              | 80    | 30             | 216 (RBstart=0)  | 3650              | 100   | 3.9  | >ACLR2                         |
| NOTE 1: Void |         |                   |       |                |                  |                   |       |      |                                |

**Table 7.3A.6.2: Void**

## 7.3B Reference sensitivity for NR-DC

For inter-band NR-DC configurations, the reference sensitivity for the corresponding inter-band CA configuration as specified in clause 7.3A applies.



## 7.3C Reference sensitivity for SUL

### 7.3C.1 General

The reference sensitivity power level REFSENS is the minimum mean power applied to each one of the UE antenna ports for all UE categories, at which the throughput shall meet or exceed the requirements for the specified reference measurement channel. For operations with 4 Rx antenna ports, the MSD in the applicable bands shall be increased by the absolute value of  $\Delta R_{IB,4R}$  in Table 7.3.2-2 when MSD > 0.

For reference sensitivity exception test points where the specified carrier frequency does not correspond to a valid NR-ARFCN, the closest NR-ARFCN as specified in clause 5.4.2 applies.

For reference sensitivity level tests or reference sensitivity exception tests specified in clause 7.3C, SCS=15kHz based UL test configuration can be replaced by SCS=30kHz based UL test configuration. The equivalent substitution relationship between different SCS UL test configuration is shown in table 7.3A.1-1 for the operating bands above 2.2GHz.

### 7.3C.2 Reference sensitivity power level for SUL

For SUL operation, the reference receive sensitivity (REFSENS) requirement for downlink bands specified in Table 7.3.2-1a, Table 7.3.2-1b and Table 7.3.2-2 shall be met for an uplink transmission bandwidth less than or equal to that specified in Table 7.3.2-3 or supplementary uplink transmission bandwidth less than or equal to that specified in Table 7.3C.2-1 with reference measurement channels as specified in Annexes A.2.2.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1), unless sensitivity degradation is allowed in this clause of this specification. These exceptions also apply to any higher order CA or DC combination containing one of the exception combinations in this clause as subset.

For SUL operation with downlink CA, the reference receive sensitivity (REFSENS) requirement for downlink bands specified in clause 7.3A.2 shall be met for an uplink transmission bandwidth less than or equal to that specified in Table 7.3.2-3 or supplementary uplink transmission bandwidth less than or equal to that specified in Table 7.3C.2-1 with reference measurement channels as specified in Annexes A.2.2.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1), unless sensitivity degradation is allowed in this clause of this specification. These exceptions also apply to any higher order CA or DC combination containing one of the exception combinations in this clause as subset.

**Table 7.3C.2-1: Supplementary uplink configuration for reference sensitivity**

| NR Band / SCS of SUL band / Channel bandwidth of the DL band / N <sub>RB</sub> |                  |                       |       |        |        |        |        |        |        |        |        |        |        |        |         |
|--------------------------------------------------------------------------------|------------------|-----------------------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|
| DL band                                                                        | SUL band         | SCS of SUL band (kHz) | 5 MHz | 10 MHz | 15 MHz | 20 MHz | 25 MHz | 30 MHz | 40 MHz | 50 MHz | 60 MHz | 70 MHz | 80 MHz | 90 MHz | 100 MHz |
| n1                                                                             | n80              | 15                    | 160   | 160    | 160    | 160    | 160    | 160    | 160    |        |        |        |        |        |         |
| n1                                                                             | n84 <sup>1</sup> | 15                    | 25    | 50     | 75     | 100    | 128    | 128    | 128    | 128    |        |        |        |        |         |
| n3                                                                             | n80 <sup>1</sup> | 15                    | 25    | 50     | 50     | 50     | 50     | 50     | 50     |        |        |        |        |        |         |
| n24                                                                            | n99 <sup>1</sup> | 15                    | 25    | 50     |        |        |        |        |        |        |        |        |        |        |         |
| n28                                                                            | n83 <sup>1</sup> | 15                    | 25    | 25     | 25     | 25     |        | 25     |        |        |        |        |        |        |         |
| n41                                                                            | n80              | 15                    |       | 160    | 160    | 160    |        | 160    | 160    | 160    | 160    |        | 160    | 160    | 160     |
| n41                                                                            | n81              | 15                    |       | 100    | 100    | 100    |        |        | 100    | 100    | 100    |        | 100    | 100    | 100     |
| n41                                                                            | n83              | 15                    |       | 100    | 100    | 100    |        | 100    | 100    | 100    | 100    |        | 100    | 100    | 100     |
|                                                                                |                  | 30                    |       | 50     | 50     | 50     |        | 50     | 50     | 50     | 50     |        | 50     | 50     | 50      |
| n41                                                                            | n95              | 15                    |       | 75     | 75     | 75     |        | 75     | 75     | 75     | 75     |        | 75     | 75     | 75      |
| n41                                                                            | n97              | 30                    |       | 216    | 216    | 216    |        | 216    | 216    | 216    | 216    | 216    | 216    | 216    | 216     |
| n41                                                                            | n98              | 15                    |       | 216    | 216    | 216    |        | 216    | 216    | 216    | 216    |        | 216    | 216    | 216     |
| n41                                                                            | n99              | 15                    |       | 50     | 50     | 50     |        | 50     | 50     | 50     | 50     |        | 50     | 50     | 50      |
| n48                                                                            | n99              | 15                    |       | 50     | 50     | 50     |        | 50     | 50     | 50     | 50     |        | 50     | 50     | 50      |
| n77                                                                            | n80              | 15                    |       | 160    | 160    | 160    |        |        | 160    | 160    | 160    |        | 160    | 160    | 160     |
| n77                                                                            | n84              | 15                    |       | 100    | 100    | 100    |        |        | 100    | 100    | 100    |        | 100    | 100    | 100     |
| n77                                                                            | n99              | 15                    |       | 50     | 50     | 50     | 50     | 50     | 50     | 50     | 50     | 50     | 50     | 50     | 50      |
| n78                                                                            | n80              | 15                    |       | 160    | 160    | 160    | 160    | 160    | 160    | 160    | 160    | 160    | 160    | 160    | 160     |
| n78                                                                            | n81              | 15                    |       | 100    | 100    | 100    |        |        | 100    | 100    | 100    |        | 100    | 100    | 100     |

|     |     |    |  |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|----|--|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| n78 | n82 | 15 |  | 100 | 100 | 100 |     |     | 100 | 100 | 100 |     | 100 | 100 | 100 |
| n78 | n83 | 15 |  | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| n78 | n84 | 15 |  | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| n78 | n86 | 15 |  | 216 | 216 | 216 |     |     | 216 | 216 | 216 |     | 216 | 216 | 216 |
| n79 | n80 | 15 |  |     |     |     |     |     | 160 | 160 | 160 |     | 160 |     | 160 |
| n79 | n83 | 15 |  |     |     |     |     |     | 100 | 100 | 100 |     | 100 |     | 100 |
|     |     | 30 |  |     |     |     |     |     | 50  | 50  | 50  |     | 50  |     | 50  |
| n79 | n81 | 15 |  |     |     |     |     |     | 100 | 100 | 100 |     | 100 |     | 100 |
| n79 | n84 | 15 |  |     |     |     |     |     | 100 | 100 | 100 |     | 100 |     | 100 |
| n79 | n95 | 15 |  |     |     |     |     |     | 75  | 75  | 75  |     | 75  |     | 75  |
| n79 | n97 | 15 |  |     |     |     |     |     | 270 | 270 | 270 |     | 270 |     | 270 |
| n79 | n98 | 15 |  |     |     |     |     |     | 216 | 216 | 216 |     | 216 |     | 216 |

NOTE 1: The Tx-Rx carrier center frequency separation between SUL band and DL band is the same as the Tx-Rx carrier center frequency separation of DL band specified in table 5.4.4-1 from TS 38.101-1. The channel bandwidth of SUL band is the same as DL band. This restriction of REFSSENS configurations applies also for these carriers when applicable SUL configuration is part of a higher order configuration.

For the UE that supports any of the SUL operation given in Table 7.3C.2-2, exceptions to the requirements specified in Table 7.3.2-1a and Table 7.3.2-1b are allowed for different combinations of UL configurations and DL channel bandwidths when the uplink is active in a lower frequency band and is within a specified frequency range such that transmitter harmonics fall within the downlink transmission bandwidth assigned in a higher band as noted in Table 7.3C.2-2. For these exceptions, only the listed test points in Table 7.3C.2-2 are needed to be tested.

**Table 7.3C.2-2: Reference sensitivity and uplink/downlink configurations for SUL operation (exceptions due to uplink harmonic issue)**

| UL band | DL band | UL BW | SCS of UL band | UL RB Allocation | DL BW | MSD  | UL/DL fc condition | UL/DL harmonic order |
|---------|---------|-------|----------------|------------------|-------|------|--------------------|----------------------|
|         |         | (MHz) | (kHz)          | L <sub>CRB</sub> | (MHz) | (dB) |                    |                      |
| n80     | n77     | 5     | 15             | 25 (RBstart=0)   | 10    | 23.9 | NOTE 2             | UL2/DL1 direct-hit   |
| n80     | n77     | 10    | 15             | 50 (RBstart=0)   | 100   | 13.8 | NOTE 2             | UL2/DL1 direct-hit   |
| n80     | n77     | 5     | 15             | 25 (RBstart=0)   | 10    | 1.1  | NOTE 6             | UL2/DL1 near-miss    |
| n80     | n78     | 5     | 15             | 25 (RBstart=0)   | 10    | 23.9 | NOTE 2             | UL2/DL1 direct-hit   |
| n80     | n78     | 10    | 15             | 50 (RBstart=0)   | 100   | 13.8 | NOTE 2             | UL2/DL1 direct-hit   |
| n80     | n78     | 5     | 15             | 25 (RBstart=0)   | 10    | 1.1  | NOTE 6             | UL2/DL1 near-miss    |
| n81     | n41     | 5     | 15             | 16 (RBstart=4)   | 10    | 13   | NOTE 3             | UL3/DL1 direct-hit   |
| n81     | n41     | 5     | 15             | 25 (RBstart=0)   | 100   | 3.5  | NOTE 3             | UL3/DL1 direct-hit   |
| n81     | n78     | 5     | 15             | 16 (RBstart=4)   | 10    | 10.8 | NOTE 4             | UL4/DL1 direct-hit   |
| n81     | n78     | 5     | 15             | 25 (RBstart=0)   | 100   | 1.4  | NOTE 4             | UL4/DL1 direct-hit   |
| n81     | n79     | 5     | 15             | 25 (RBstart=0)   | 40    | 6.8  | NOTE 5             | UL5/DL1 direct-hit   |
| n81     | n79     | 5     | 15             | 25 (RBstart=0)   | 100   | 4.4  | NOTE 5             | UL5/DL1 direct-hit   |
| n82     | n78     | 5     | 15             | 16 (RBstart=4)   | 10    | 10.8 | NOTE 4             | UL4/DL1 direct-hit   |
| n82     | n78     | 5     | 15             | 20 (RBstart=2)   | 100   | 1.0  | NOTE 4             | UL4/DL1 direct-hit   |
| n83     | n78     | 5     | 15             | 10 (RBstart=8)   | 10    | 10.4 | NOTE 5             | UL5/DL1 direct-hit   |
| n83     | n78     | 5     | 15             | 25 (RBstart=0)   | 100   | 0.7  | NOTE 5             | UL5/DL1 direct-hit   |
| n84     | n77     | 5     | 15             | 25 (RBstart=0)   | 10    | 23.9 | NOTE 2             | UL2/DL1              |

| UL band                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | DL band | UL BW | SCS of UL band | UL RB Allocation | DL BW | MSD  | UL/DL fc condition | UL/DL harmonic order |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------|----------------|------------------|-------|------|--------------------|----------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |         | (MHz) | (kHz)          | L <sub>CRB</sub> | (MHz) | (dB) |                    |                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |         |       |                |                  |       |      |                    | direct-hit           |
| n84                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | n77     | 10    | 15             | 100 (RBstart=0)  | 100   | 13.8 | NOTE 2             | UL2/DL1 direct-hit   |
| n84                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | n77     | 5     | 15             | 25 (RBstart=0)   | 10    | 1.1  | NOTE 6             | UL2/DL1 near-miss    |
| n86                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | n78     | 5     | 15             | 25 (RBstart=0)   | 10    | 23.9 | NOTE 2             | UL2/DL1 direct-hit   |
| n86                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | n78     | 10    | 15             | 100 (RBstart=0)  | 100   | 13.8 | NOTE 2             | UL2/DL1 direct-hit   |
| n86                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | n78     | 5     | 15             | 25 (RBstart=0)   | 10    | 1.1  | NOTE 6             | UL2/DL1 near-miss    |
| n97                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | n79     | 5     | 15             | 100 (RBstart=0)  | 40    | 29.4 | NOTE 2             | UL2/DL1 direct-hit   |
| n97                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | n79     | 5     | 15             | 270 (RBstart=0)  | 100   | 25.3 | NOTE 2             | UL2/DL1 direct-hit   |
| n99                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | n77     | 5     | 15             | 25 (RBstart=0)   | 10    | 23.9 | NOTE 2             | UL2/DL1 direct-hit   |
| n99                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | n77     | 10    | 15             | 100 (RBstart=0)  | 100   | 13.8 | NOTE 2             | UL2/DL1 direct-hit   |
| n99                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | n77     | 5     | 15             | 25 (RBstart=0)   | 10    | 1.1  | NOTE 6             | UL2/DL1 near-miss    |
| <p>NOTE 1: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the aggressor (lower) band for which the 2<sup>nd</sup> / 3<sup>rd</sup> / 4<sup>th</sup> / 5<sup>th</sup> transmitter harmonic is within the downlink transmission bandwidth of a victim (higher) band.</p> <p>NOTE 2: The requirements should be verified for UL NR ARFCN of the aggressor (lower) band (superscript LB) such that <math>f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.2 \rfloor \cdot 0.1</math> in MHz and <math>F_{UL\_low}^{LB} + BW_{Channel}^{LB} / 2 \leq f_{UL}^{LB} \leq F_{UL\_high}^{LB} - BW_{Channel}^{LB} / 2</math> with carrier frequency in the victim (higher) band in MHz and the channel bandwidth configured in the lower band.</p> <p>NOTE 3: The requirements should be verified for UL NR ARFCN of the aggressor (lower) band (superscript LB) such that <math>f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.3 \rfloor \cdot 0.1</math> in MHz and <math>F_{UL\_low}^{LB} + BW_{Channel}^{LB} / 2 \leq f_{UL}^{LB} \leq F_{UL\_high}^{LB} - BW_{Channel}^{LB} / 2</math> with the carrier frequency in the victim (higher) band in MHz and the channel bandwidth configured in the low band.</p> <p>NOTE 4: The requirements should be verified for UL EARFCN of the aggressor (lower) band (superscript LB) such that <math>f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.4 \rfloor \cdot 0.1</math> in MHz and <math>F_{UL\_low}^{LB} + BW_{Channel}^{LB} / 2 \leq f_{UL}^{LB} \leq F_{UL\_high}^{LB} - BW_{Channel}^{LB} / 2</math> with <math>f_{DL}^{HB}</math> carrier frequency in the victim (higher) band in MHz and <math>BW_{Channel}^{LB}</math> the channel bandwidth configured in the lower band.</p> <p>NOTE 5: The requirements should be verified for UL NR-ARFCN of the aggressor (lower) band (superscript LB) such that <math>f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.5 \rfloor \cdot 0.1</math> in MHz and <math>F_{UL\_low}^{LB} + BW_{Channel}^{LB} / 2 \leq f_{UL}^{LB} \leq F_{UL\_high}^{LB} - BW_{Channel}^{LB} / 2</math> with <math>f_{DL}^{HB}</math> carrier frequency in the victim (higher) band in MHz and <math>BW_{Channel}^{LB}</math> the channel bandwidth configured in the lower band.</p> <p>NOTE 6: The requirements are only applicable to channel bandwidths no larger than 20 MHz and with a carrier frequency at <math>\pm (20 + BW_{Channel}^{HB} / 2)</math> MHz offset from <math>2 f_{UL}^{LB}</math> in the victim (higher band) with <math>F_{UL\_low}^{LB} + BW_{Channel}^{LB} / 2 \leq f_{UL}^{LB} \leq F_{UL\_high}^{LB} - BW_{Channel}^{LB} / 2</math>, where <math>BW_{Channel}^{LB}</math> and <math>BW_{Channel}^{HB}</math> are the channel bandwidths configured in the aggressor (lower) and victim (higher) bands in MHz, respectively.</p> |         |       |                |                  |       |      |                    |                      |

Table 7.3C.2-3: Void

For the UE that supports any of the SUL operation given in Table 7.3C.2-4, reference sensitivity degradation is allowed for different combinations of UL configurations and DL channel bandwidths when a DL band is impacted by UL band due to cross band isolation issues. For these exceptions, only the listed test points in Table 7.3C.2-4 are needed to be tested.

**Table 7.3C.2-4: Reference sensitivity and uplink/downlink configurations for SUL operation (exceptions due to cross band isolation)**

| UL band | DL band | UL F <sub>c</sub> | UL BW | SCS of UL band | UL RB Allocation | DL F <sub>c</sub> | DL BW | MSD  | X band interference source |
|---------|---------|-------------------|-------|----------------|------------------|-------------------|-------|------|----------------------------|
|         |         | (MHz)             | (MHz) | (kHz)          | L <sub>CRB</sub> | (MHz)             | (MHz) | (dB) |                            |
| n80     | n41     | 1765              | 40    | 15             | 50 (RBstart=166) | 2501              | 10    | 0.7  | >ACLR2                     |
| n80     | n41     | 1765              | 40    | 15             | 50 (RBstart=166) | 2546              | 100   | 0.7  | >ACLR2                     |
| n95     | n41     | 2017.5            | 15    | 15             | 75 (RBstart=4)   | 2501              | 10    | 3.2  | >ACLR2                     |
| n95     | n41     | 2017.5            | 15    | 15             | 75 (RBstart=4)   | 2546              | 100   | 3.2  | >ACLR2                     |
| n97     | n41     | 2350              | 100   | 30             | 270 (RBstart=3)  | 2501              | 10    | 28.1 | ACLR2                      |
| n97     | n41     | 2360              | 80    | 30             | 216 (RBstart=1)  | 2546              | 100   | 10.6 | ACLR2                      |
| n98     | n41     | 1900              | 40    | 15             | 216 (RBstart=0)  | 2501              | 10    | 3.3  | >ACLR2                     |

**Table 7.3C.2-5: Void**

### 7.3C.3 $\Delta R_{IB,c}$ for SUL

#### 7.3C.3.1 General

For a UE supporting a SUL configuration, the  $\Delta R_{IB,c}$  applies for both SC and SUL operation.

#### 7.3C.3.2 SUL band combination

For the UE which supports SUL band combination, the minimum requirement for reference sensitivity in clause 7.3C.2 shall be increased by the amount given in  $\Delta R_{IB,c}$  defined in clause 7.3C.3.2 for the applicable operating bands. Unless otherwise stated,  $\Delta R_{IB,c}$  is set to zero.

In case the UE supports more than one of band combinations for CA, SUL or DC, and an operating band belongs to more than one band combinations then

- When the operating band frequency range is  $\leq 1$  GHz, the applicable additional  $\Delta R_{IB,c}$  shall be the average value for all band combinations defined in clause 7.3A, 7.3B, 7.3C in this specification and 7.3A, 7.3B in TS 38.101-3 [3], truncated to one decimal place that apply for that operating band among the supported band combinations. In case there is a harmonic relation between low band UL and high band DL, then the maximum  $\Delta R_{IB,c}$  among the different supported band combinations involving such band shall be applied
- When the operating band frequency range is  $> 1$  GHz, the applicable additional  $\Delta R_{IB,c}$  shall be the maximum value for all band combinations defined in clause 7.3A, 7.3B, 7.3C in this specification and 7.3A, 7.3B in TS 38.101-3 [3] for the applicable operating bands.

#### 7.3C.3.2.1 $\Delta R_{IB,c}$ for two bands

**Table 7.3C.3.2.1-1:  $\Delta R_{IB,c}$  due to SUL (two bands)**

| Band combination for SUL | NR Band | $\Delta R_{IB,c}$ (dB) |
|--------------------------|---------|------------------------|
| SUL_n41-n80              | n41     | 0.5 (note)             |
| SUL_n41-n95              | n41     | 0.2                    |
| SUL_n41-n98              | n41     | 0.2                    |
| SUL_n48-n99              | n48     | 0.5                    |
| SUL_n77-n80              | n77     | 0.5                    |
| SUL_n77-n84              | n77     | 0.5                    |

|                                                                                                 |     |     |
|-------------------------------------------------------------------------------------------------|-----|-----|
| SUL_n77-n99                                                                                     | n77 | 0.5 |
| SUL_n78-n80                                                                                     | n78 | 0.5 |
| SUL_n78-n81                                                                                     | n78 | 0.5 |
| SUL_n78-n82                                                                                     | n78 | 0.5 |
| SUL_n78-n83                                                                                     | n78 | 0.5 |
| SUL_n78-n84                                                                                     | n78 | 0.5 |
| SUL_n78-n86                                                                                     | n78 | 0.5 |
| SUL_n79-n83                                                                                     | n79 | 0.5 |
| SUL_n79-n97                                                                                     | n79 | 0.5 |
| SUL_n79-n98                                                                                     | n79 | 0.5 |
| NOTE: The requirement is applied for UE transmitting on the frequency range of 2496 – 2515 MHz. |     |     |

### 7.3C.3.2.2 $\Delta R_{IB,c}$ for three bands

**Table 7.3C.3.2.2-1:  $\Delta R_{IB,c}$  due to SUL (three bands)**

| Band combination for SUL                                                                        | NR Band | $\Delta R_{IB,c}$ (dB) |
|-------------------------------------------------------------------------------------------------|---------|------------------------|
| CA_n1_n78-n80                                                                                   | n1      | 0.2                    |
|                                                                                                 | n78     | 0.5                    |
| CA_n1_n78-n84                                                                                   | n1      | 0.2                    |
|                                                                                                 | n78     | 0.5                    |
| CA_n3_n41-n80                                                                                   | n41     | 0.5 (note)             |
| CA_n3_n78-n80                                                                                   | n3      | 0.2                    |
|                                                                                                 | n78     | 0.5                    |
| CA_n3_n79-n80                                                                                   | n79     | 0.5                    |
| CA_n28_n41-n83                                                                                  | n28     | 0.2                    |
| CA_n28_n79-n83                                                                                  | n28     | 0.2                    |
|                                                                                                 | n79     | 0.5                    |
| CA_n41_n79-n80                                                                                  | n41     | 0.5                    |
|                                                                                                 | n79     | 0.5                    |
| CA_n41_n79-n83                                                                                  | n41     | 0.5                    |
|                                                                                                 | n79     | 0.5                    |
| CA_n41_n79-n97                                                                                  | n41     | 0                      |
|                                                                                                 | n79     | 0.8                    |
| CA_n79_n41-n80                                                                                  | n41     | 0.5                    |
|                                                                                                 | n79     | 0.5                    |
| CA_n79_n41-n83                                                                                  | n41     | 0.5                    |
|                                                                                                 | n79     | 0.5                    |
| CA_n79_n41-n97                                                                                  | n41     | 0                      |
|                                                                                                 | n79     | 0.8                    |
| NOTE: The requirement is applied for UE transmitting on the frequency range of 2496 – 2515 MHz. |         |                        |

### 7.3C.3.2.3 $\Delta R_{IB,c}$ for four bands

**Table 7.3C.3.2.3-1:  $\Delta R_{IB,c}$  due to SUL (four bands)**

| Band combination for SUL | NR Band | $\Delta R_{IB,c}$ (dB) |
|--------------------------|---------|------------------------|
| CA_n28-n79_n41-n83       | n28     | 0.2                    |
|                          | n41     | 0                      |
|                          | n79     | 0.8                    |
| CA_n28-n41_n79-n83       | n28     | 0.2                    |
|                          | n41     | 0                      |
|                          | n79     | 0.8                    |

## 7.3D Reference sensitivity for UL MIMO

For UE with two transmitter antenna connectors in closed-loop spatial multiplexing scheme, the minimum requirements specified in clause 7.3 shall be met with the UL MIMO configurations described in clause 6.2D.1 and clause 6.2F.1D

for shared spectrum access operation, and the reference measurement channels as specified in Annex A.2.2 for CP-OFDM waveforms shall apply. For UL MIMO, the parameter  $P_{\text{UMAX}}$  is the total transmitter power over the two transmits power over the two transmit antenna connectors.

## 7.3E Reference sensitivity for V2X

### 7.3E.1 General

The reference sensitivity power level  $P_{\text{REFSENS\_V2X}}$  is the minimum mean power applied to each one of the UE antenna port for V2X UE, at which the throughput shall meet or exceed the requirements for the specified reference measurement channel.

### 7.3E.2 Minimum requirements

When UE is configured for NR V2X reception non-concurrent with NR uplink transmissions for NR V2X operating bands specified in Table 5.2E.1-1, the throughput shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.7.2 with parameters specified in Table 7.3E.2-1.

**Table 7.3E.2-1: Reference sensitivity of NR V2X Bands (PC5)**

| NR V2X Band                                                                    | SCS kHz | Channel bandwidth / P <sub>REFSENS_V2X</sub> (dBm) |        |        |        |        | Duplex Mode |
|--------------------------------------------------------------------------------|---------|----------------------------------------------------|--------|--------|--------|--------|-------------|
|                                                                                |         | 5MHz <sup>4</sup>                                  | 10 MHz | 20 MHz | 30 MHz | 40 MHz |             |
| n14                                                                            | 15      | -95.9                                              | -92.7  |        |        |        | HD          |
|                                                                                | 30      |                                                    | -93.0  |        |        |        |             |
|                                                                                | 60      |                                                    |        |        |        |        |             |
| n38                                                                            | 15      |                                                    | -96.5  | -93.2  | -91.4  | -90.1  | HD          |
|                                                                                | 30      |                                                    | -96.1  | -93.4  | -91.7  | -90.2  |             |
|                                                                                | 60      |                                                    | -96.9  | -93.1  | -91.9  | -90.4  |             |
| n47                                                                            | 15      |                                                    | -92.5  | -89.2  | -87.4  | -86.1  | HD          |
|                                                                                | 30      |                                                    | -92.1  | -89.4  | -87.7  | -86.2  |             |
|                                                                                | 60      |                                                    | -92.9  | -89.1  | -87.9  | -86.4  |             |
| n79 <sup>5</sup>                                                               | 15      |                                                    | -95.5  | -92.2  | -90.4  | -89.1  | HD          |
|                                                                                | 30      |                                                    | -95.1  | -92.4  | -90.7  | -89.2  |             |
|                                                                                | 60      |                                                    | -95.9  | -92.1  | -90.9  | -89.4  |             |
| NOTE 1: Reference measurement channel is defined in A.7.2.                     |         |                                                    |        |        |        |        |             |
| NOTE 2: The signal power is specified per antenna port.                        |         |                                                    |        |        |        |        |             |
| NOTE 3: Void.                                                                  |         |                                                    |        |        |        |        |             |
| NOTE 4: The CBW is only applicable for PS UE in n14.                           |         |                                                    |        |        |        |        |             |
| NOTE 5: These REFSENS values do not consider the impact of the near/far effect |         |                                                    |        |        |        |        |             |

**Table 7.3E.2-2: Sidelink TX configuration for reference sensitivity of NR V2X Bands (PC5)**

|                                                                                                                               |         | NR Band / SCS / Channel bandwidth / Duplex mode |                 |        |        |        |             |
|-------------------------------------------------------------------------------------------------------------------------------|---------|-------------------------------------------------|-----------------|--------|--------|--------|-------------|
| NR V2X Band                                                                                                                   | SCS kHz | 5 MHz <sup>3</sup>                              | 10 MHz          | 20 MHz | 30 MHz | 40 MHz | Duplex Mode |
| n14                                                                                                                           | 15      | 20                                              | 20              |        |        |        | HD          |
|                                                                                                                               | 30      |                                                 | 10              |        |        |        |             |
|                                                                                                                               | 60      |                                                 |                 |        |        |        |             |
| n38                                                                                                                           | 15      |                                                 | 50              | 105    | 160    | 216    | HD          |
|                                                                                                                               | 30      |                                                 | 24              | 50     | 75     | 105    |             |
|                                                                                                                               | 60      |                                                 | 10 <sup>2</sup> | 24     | 36     | 50     |             |
| n47                                                                                                                           | 15      |                                                 | 50              | 105    | 160    | 216    | HD          |
|                                                                                                                               | 30      |                                                 | 24              | 50     | 75     | 105    |             |
|                                                                                                                               | 60      |                                                 | 10 <sup>2</sup> | 24     | 36     | 50     |             |
| n79                                                                                                                           | 15      |                                                 | 50              | 105    | 160    | 216    | HD          |
|                                                                                                                               | 30      |                                                 | 24              | 50     | 75     | 105    |             |
|                                                                                                                               | 60      |                                                 | 10 <sup>2</sup> | 24     | 36     | 50     |             |
| NOTE 1: The sidelink allocated RB (L <sub>CRB</sub> ) size could be adjusted according to resource pool configuration in [7]. |         |                                                 |                 |        |        |        |             |
| NOTE 2: For the case, 11 RB is allowed for S-SSB Block.                                                                       |         |                                                 |                 |        |        |        |             |
| NOTE 3: The CBW is only applicable for PS UE in n14.                                                                          |         |                                                 |                 |        |        |        |             |

### 7.3E.3 Reference sensitivity power level for V2X concurrent operation

When UE is configured for NR V2X reception on V2X carrier concurrent with NR uplink and downlink, NR V2X sidelink throughput for the carrier shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.7.2 with parameters specified in Table 7.3E.2-1 and 7.3E.2-2. Also, the NR downlink throughput shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.3 with parameters specified in table 7.3.2-1a, 7.3.2-1b, 7.3.2-2 and 7.3.2-3. The reference sensitivity is defined to be met with all downlink component carriers active. The REFSENS of Uu downlink and PC5 sidelink will be tested at the same time. Exceptions to reference sensitivity with different transmission and reception configurations are allowed for the combinations of aggressor and victim bands specified in table 7.3E.3-3 and 7.3E.3-4. The limited test configurations are specified in table 7.3E.3-3 and 7.3E.3-4 to verify MSD requirements.

For the intra-band concurrent NR V2X operation, the reference sensitivity power level shall be applied per carrier. The requirements in clause 7.3.2 shall be applied for NR downlink carrier and the requirements in clause 7.3E.2 shall be applied for NR sidelink carrier. NR V2X sidelink throughput for the carrier shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.7.2. Also, the NR downlink throughput shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.3.2 in TS38.101-1.

For reference sensitivity exception test points where the specified carrier frequency does not correspond to a valid NR-ARFCN, the closest NR-ARFCN as specified in clause 5.4.2 applies.

Table 7.3E.3-1: Void

Table 7.3E.3-2:  $\Delta R_{IB,V2X}$  (two bands)

| V2X inter-band concurrent band Combination | NR Band | $\Delta R_{IB,V2X}$ [dB] |
|--------------------------------------------|---------|--------------------------|
| V2X_n71-n47                                | n71     | 0.0                      |

Table 7.3E.3-3: Reference sensitivity exceptions (MSD) due to cross band isolation for inter-band concurrent operation

| Aggressor band | Victim band | Aggressor band $F_c$ | Aggressor band BW | SCS of Aggressor band | Aggressor band RB Allocation | Victim band $F_c$ | Victim band BW | MSD |
|----------------|-------------|----------------------|-------------------|-----------------------|------------------------------|-------------------|----------------|-----|
|                |             | (MHz)                | (MHz)             | (kHz)                 | $L_{CRB}$                    | (MHz)             | (MHz)          |     |
| n79            | n47         | 4980                 | 40                | 15                    | 216 (RBstart=0)              | 5860              | 10             | 3.3 |
| n47            | n79         | 5860                 | 10                | 15                    | 50 (RBstart=0)               | 4980              | 40             | 3.3 |

Table 7.3E.3-4: Reference sensitivity exceptions (MSD) due to harmonic interference for inter-band concurrent operation

| Aggressor band                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Victim band | Aggressor band BW | SCS of Aggressor band | Aggressor band RB Allocation | Victim band BW | MSD  | UL/DL fc condition | UL/DL harmonic order |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------------|-----------------------|------------------------------|----------------|------|--------------------|----------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |             | (MHz)             | (kHz)                 | $L_{CRB}$                    | (MHz)          | (dB) |                    |                      |
| n1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | n47         | 5                 | 15                    | 16 (RBstart=4)               | 10             | 20.1 | NOTE 2             | UL3/DL1 direct-hit   |
| <p>NOTE 1: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the aggressor (lower) band for which the 2<sup>nd</sup> / 3<sup>rd</sup> / 4<sup>th</sup> / 5<sup>th</sup> transmitter harmonic is within the downlink transmission bandwidth of a victim (higher) band.</p> <p>NOTE 2: The requirements should be verified for UL NR ARFCN of the aggressor (lower) band (superscript LB) such that <math>f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.3 \rfloor 0.1</math> in MHz and <math>F_{UL\_low}^{LB} + BW_{Channel}^{LB} / 2 \leq f_{UL}^{LB} \leq F_{UL\_high}^{LB} - BW_{Channel}^{LB} / 2</math> with the carrier frequency in the victim (higher) band in MHz and the channel bandwidth configured in the low band.</p> |             |                   |                       |                              |                |      |                    |                      |

## 7.3F Reference sensitivity for shared spectrum channel access

### 7.3F.1 General

The reference sensitivity power level REFSENS is the minimum mean power applied to each one of the UE antenna ports, at which the throughput shall meet or exceed the requirements for the specified reference measurement channel.

In later clauses of Clause 7 where the value of REFSENS is used as a reference to set the corresponding requirement, the UE shall be verified against those requirements by applying the REFSENS value in Table 7.3G.2-1 with 2 Rx antenna ports tested.



## 7.3F.2 Reference sensitivity power level

The throughput shall be  $\geq 95$  % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2.2, A3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3F.2-1, Table 7.3F.2-2, and Table 7.3F.2-3.

**Table 7.3F.2-1: Two antenna port reference sensitivity QPSK PREFSENS**

| Operating band / SCS / Channel bandwidth / REFSENS                                                                                                                                              |         |                         |                                                    |             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------------------------|----------------------------------------------------|-------------|
| Operating band                                                                                                                                                                                  | SCS kHz | Channel bandwidth (MHz) | REFSENS (dBm) <sup>8</sup>                         | Duplex Mode |
| n46                                                                                                                                                                                             | 15      | 20, 40                  | -89.7 + 10log <sub>10</sub> (N <sub>RB</sub> /106) | TDD         |
|                                                                                                                                                                                                 | 30      | 20, 40, 60, 80, 100     | -89.9 + 10log <sub>10</sub> (N <sub>RB</sub> /51)  |             |
|                                                                                                                                                                                                 | 60      | 60, 80, 100             | -90.1 + 10log <sub>10</sub> (N <sub>RB</sub> /24)  |             |
| n96, n102                                                                                                                                                                                       | 15      | 20, 40                  | -89.2 + 10log <sub>10</sub> (N <sub>RB</sub> /106) | TDD         |
|                                                                                                                                                                                                 | 30      | 20, 40, 60, 80, 100     | -89.4 + 10log <sub>10</sub> (N <sub>RB</sub> /51)  |             |
|                                                                                                                                                                                                 | 60      | 60, 80, 100             | -89.6 + 10log <sub>10</sub> (N <sub>RB</sub> /24)  |             |
| NOTE 1: The REFSENS value is rounded to the nearest number down to one decimal point. “NRB” in REFSENS formula is the maximum transmission bandwidth configuration as defined in Table 5.3.2-1. |         |                         |                                                    |             |

For UE(s) equipped with 4 Rx antenna ports, reference sensitivity for 2Rx antenna ports in Table 7.3F.2-1 shall be modified by the amount given in  $\Delta R_{IB,4R}$  in Table 7.3F.2-2 for the applicable operating bands.

**Table 7.3F.2-2: Four antenna port reference sensitivity allowance  $\Delta R_{IB,4R}$**

| Operating band | $\Delta R_{IB,4R}$ (dB) |
|----------------|-------------------------|
| n46, n96, n102 | -2.2                    |

The reference receive sensitivity (REFSENS) requirement specified in Table 7.3F.2-1 and Table 7.3F.2-2 shall be met with uplink transmission bandwidth less than or equal to that specified in Table 7.3F.2-3.

**Table 7.3F.2-3: Uplink configuration for reference sensitivity**

| Operating band / SCS / Channel bandwidth |         |              |              |              |              |               |
|------------------------------------------|---------|--------------|--------------|--------------|--------------|---------------|
| Operating Band                           | SCS kHz | 20 MHz (dBm) | 40 MHz (dBm) | 60 MHz (dBm) | 80 MHz (dBm) | 100 MHz (dBm) |
| n46                                      | 15      | 100          | 216          |              |              |               |
|                                          | 30      | 50           | 100          | 162          | 216          | 270           |
|                                          | 60      | 24           | 50           | 75           | 100          | 135           |
| n96, n102                                | 15      | 100          | 216          |              |              |               |
|                                          | 30      | 50           | 100          | 162          | 216          | 270           |
|                                          | 60      | 24           | 50           | 75           | 100          | 135           |

Unless given by Table 7.3F.2-4, the minimum requirements specified in Tables 7.3F.2-1 and 7.3F.2-2 shall be verified with the network signalling value NS\_01 (Table 6.2F.3.1-1) configured.

**Table 7.3F.2-4: Network signaling value for reference sensitivity**

| Operating band | Network Signalling value |
|----------------|--------------------------|
| n46            | NS_01                    |
| n96            | NS_53                    |
| n102           | NS_01                    |

### 7.3F.3 Void

### 7.3F.4 Void

## 7.3F.4A Shared spectrum channel access CA

### 7.3F.4A.1 Intra-band contiguous shared spectrum channel access CA

For intra-band contiguous carrier aggregation, the throughput of each component carrier shall be  $\geq 95$  % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3F.2-1, Table 7.3F.2-2, and Table 7.3F.2-3.

### 7.3F.5 Void

#### 7.3F.5.1 Void

#### 7.3F.5.2 Void

#### 7.3F.5.3 Void

## 7.3G Reference sensitivity for Tx Diversity

For UE supporting Tx diversity, the minimum requirements specified in Table 7.3.2-1a, Table 7.3.2-1b, Table 7.3.2-1d and Table 7.3.2-2 shall be met with Tx diversity configuration described in clause 6.2G.1. For Tx diversity, the parameter  $P_{UMAX}$  is defined in clause 6.2G.4 with the sum of the output power from both UE antenna connectors.

### 7.3G.5 Void

#### 7.3G.5.0 Void

## 7.3I Reference sensitivity for RedCap

### 7.3I.1 General

The reference sensitivity power level REFSENS is the minimum mean power applied to each one of the UE antenna ports for all UE categories, at which the throughput shall meet or exceed the requirements for the specified reference measurement channel.

### 7.3I.2 Reference sensitivity power level

For a RedCap UE equipped with 2 Rx antenna ports, the throughput shall be  $\geq 95$  % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2.2, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3.2-1a and Table 7.3.2-1b for the applicable operating bands. The reference sensitivity (REFSENS) requirement specified for a RedCap UE equipped with 2 Rx antenna ports shall be met with uplink transmission bandwidth less than

or equal to that specified in Table 7.3.2-3 and, for FDD bands, with the Tx-Rx separation as defined in clause 5.4.4 for the applicable band and UE channel bandwidth.

For a RedCap UE equipped with 1 Rx antenna ports, reference sensitivity for 2Rx antenna ports in Table 7.3.2-1a and in Table 7.3.2-1b shall be modified by the amount given in  $\Delta R_{1R}$  in Table 7.3I.2-1 for the applicable operating bands. The reference sensitivity (REFSENS) requirement specified for a RedCap UE equipped with 1 Rx antenna ports shall be met with uplink transmission bandwidth less than or equal to that specified in Table 7.3.2-3 and, for FDD bands, with the Tx-Rx separation as defined in clause 5.4.4 for the applicable band and UE channel bandwidth.

**Table 7.3I.2-1: Single antenna port reference sensitivity allowance  $\Delta R_{1R}$**

| Operating band | Channel bandwidth (MHz) | $\Delta R_{1R}$ (dB) |
|----------------|-------------------------|----------------------|
| TDD band       | 5, 10, 15, 20           | 2.5                  |
| FDD band       | 5                       | 2.5                  |
| FDD band       | 10, 15, 20              | 3.0                  |

For a RedCap UE equipped with 2 Rx antenna ports operating in HD-FDD mode, reference sensitivity for 2Rx antenna ports in Table 7.3I.2-2 shall be met with uplink transmission bandwidth less than or equal to that specified in Table 7.3I.2-4.

**Table 7.3I.2-2: HD-FDD RedCap UE with 2 Rx antenna port reference sensitivity**

| Operating band / SCS / Channel bandwidth |         |             |              |              |              |
|------------------------------------------|---------|-------------|--------------|--------------|--------------|
| Operating Band                           | SCS kHz | 5 MHz (dBm) | 10 MHz (dBm) | 15 MHz (dBm) | 20 MHz (dBm) |
| n1                                       | 15      | -100.0      | -96.8        | -95.0        | -93.7        |
|                                          | 30      |             | -97.2        | -95.2        | -93.9        |
|                                          | 60      |             | -97.5        | -95.4        | -94.2        |
| n2                                       | 15      | -98.8       | -95.6        | -93.8        | -92.5        |
|                                          | 30      |             | -96.0        | -94.0        | -92.7        |
|                                          | 60      |             | -96.3        | -94.2        | -93.0        |
| n3                                       | 15      | -97.8       | -94.6        | -92.8        | -91.5        |
|                                          | 30      |             | -95.0        | -93.0        | -91.7        |
|                                          | 60      |             | -95.3        | -93.2        | -92.0        |
| n5                                       | 15      | -98.8       | -95.6        | -93.8        | -92.5        |
|                                          | 30      |             | -96.0        | -94.0        | -92.7        |
| n7                                       | 15      | -98.8       | -95.6        | -93.8        | -92.5        |
|                                          | 30      |             | -96.0        | -94.0        | -92.7        |
|                                          | 60      |             | -96.3        | -94.2        | -93.0        |
| n8                                       | 15      | -97.8       | -94.6        | -92.8        | -91.5        |
|                                          | 30      |             | -95.0        | -93.0        | -91.7        |
| n12                                      | 15      | -97.8       | -94.6        | -92.8        |              |
|                                          | 30      |             | -95.0        | -93.0        |              |
| n13                                      | 15      | -97.8       | -94.6        |              |              |
|                                          | 30      |             | -95.0        |              |              |
| n14                                      | 15      | -97.8       | -94.6        |              |              |
|                                          | 30      |             | -95.0        |              |              |
| n18                                      | 15      | -100.0      | -96.8        | -95.0        |              |
|                                          | 30      |             | -97.2        | -95.2        |              |
| n20                                      | 15      | -97.8       | -94.6        | -92.8        | -91.5        |
|                                          | 30      |             | -95.0        | -93.0        | -91.7        |
| n24                                      | 15      | -100.0      | -96.8        |              |              |
|                                          | 30      |             | -97.2        |              |              |
|                                          | 60      |             | -97.5        |              |              |
| n25                                      | 15      | -97.3       | -94.1        | -92.3        | -91.0        |
|                                          | 30      |             | -94.5        | -92.5        | -91.2        |
|                                          | 60      |             | -94.8        | -92.7        | -91.5        |
| n26                                      | 15      | -98.3       | -95.1        | -93.3        | -92.0        |
|                                          | 30      |             | -95.5        | -93.5        | -92.2        |
| n28                                      | 15      | -99.3       | -96.1        | -94.3        | -93.0        |

| Operating band / SCS / Channel bandwidth |         |             |              |              |              |
|------------------------------------------|---------|-------------|--------------|--------------|--------------|
| Operating Band                           | SCS kHz | 5 MHz (dBm) | 10 MHz (dBm) | 15 MHz (dBm) | 20 MHz (dBm) |
| n30                                      | 30      |             | -96.5        | -94.5        | -93.2        |
|                                          | 15      | -99.5       | -96.3        |              |              |
|                                          | 30      |             | -96.7        |              |              |
| n65                                      | 15      | -100.0      | -96.8        | -95.0        | -93.7        |
|                                          | 30      |             | -97.2        | -95.2        | -93.9        |
|                                          | 60      |             | -97.5        | -95.4        | -94.2        |
| n66                                      | 15      | -100.0      | -96.8        | -95.0        | -93.7        |
|                                          | 30      |             | -97.2        | -95.2        | -93.9        |
|                                          | 60      |             | -97.5        | -95.4        | -94.2        |
| n70                                      | 15      | -100.0      | -96.8        | -95.0        | -93.7        |
|                                          | 30      |             | -97.2        | -95.2        | -93.9        |
|                                          | 60      |             | -97.5        | -95.4        | -94.2        |
| n71                                      | 15      | -98.0       | -94.8        | -93.0        | -91.7        |
|                                          | 30      |             | -95.2        | -93.2        | -91.9        |
| n74                                      | 15      | -100.0      | -96.8        | -95.0        | -93.7        |
|                                          | 30      |             | -97.2        | -95.2        | -93.9        |
|                                          | 60      |             | -97.5        | -95.4        | -94.2        |
| n85                                      | 15      | -97.8       | -94.6        | -92.8        |              |
|                                          | 30      |             | -95.0        | -93.0        |              |
| n91                                      | 15      | -100.0      |              |              |              |
| n92                                      | 15      | -100.0      | -96.8        | -95.0        | -93.7        |
|                                          | 30      |             | -97.2        | -95.2        | -93.9        |
| n93                                      | 15      | -100.0      |              |              |              |
| n94                                      | 15      | -100.0      | -96.8        | -95.0        | -93.7        |
|                                          | 30      |             | -97.2        | -95.2        | -93.9        |

For a RedCap UE equipped with 1 Rx antenna ports and operating in HD-FDD mode, reference sensitivity for 1Rx antenna ports in Table 7.3I.2-3 shall be met with uplink transmission bandwidth less than or equal to that specified in Table 7.3I.2-4.

**Table 7.3I.2-3: HD-FDD RedCap UE with 1 Rx antenna port reference sensitivity**

| Operating band / SCS / Channel bandwidth |         |             |              |              |              |
|------------------------------------------|---------|-------------|--------------|--------------|--------------|
| Operating Band                           | SCS kHz | 5 MHz (dBm) | 10 MHz (dBm) | 15 MHz (dBm) | 20 MHz (dBm) |
| n1                                       | 15      | -97.5       | -94.3        | -92.5        | -91.2        |
|                                          | 30      |             | -94.7        | -92.7        | -91.4        |
|                                          | 60      |             | -95.0        | -92.9        | -91.7        |
| n2                                       | 15      | -96.3       | -93.1        | -91.3        | -90.0        |
|                                          | 30      |             | -93.5        | -91.5        | -90.2        |
|                                          | 60      |             | -93.8        | -91.7        | -90.5        |
| n3                                       | 15      | -95.3       | -92.1        | -90.3        | -89.0        |
|                                          | 30      |             | -92.5        | -90.5        | -89.2        |
|                                          | 60      |             | -92.8        | -90.7        | -89.5        |
| n5                                       | 15      | -96.3       | -93.1        | -91.3        | -90.0        |
|                                          | 30      |             | -93.5        | -91.5        | -90.2        |
| n7                                       | 15      | -96.3       | -93.1        | -91.3        | -90.0        |
|                                          | 30      |             | -93.5        | -91.5        | -90.2        |
|                                          | 60      |             | -93.8        | -91.7        | -90.5        |
| n8                                       | 15      | -95.3       | -92.1        | -90.3        | -89.0        |
|                                          | 30      |             | -92.5        | -90.5        | -89.2        |
| n12                                      | 15      | -95.3       | -92.1        | -90.3        |              |
|                                          | 30      |             | -92.5        | -90.5        |              |
| n13                                      | 15      | -95.3       | -92.1        |              |              |
|                                          | 30      |             | -92.5        |              |              |
| n14                                      | 15      | -95.3       | -92.1        |              |              |
|                                          | 30      |             | -92.5        |              |              |
| n18                                      | 15      | -97.5       | -94.3        | -92.5        |              |
|                                          | 30      |             | -94.7        | -92.7        |              |
| n20                                      | 15      | -95.3       | -92.1        | -90.3        | -89.0        |
|                                          | 30      |             | -92.5        | -90.5        | -89.2        |

| Operating band / SCS / Channel bandwidth |         |             |              |              |              |
|------------------------------------------|---------|-------------|--------------|--------------|--------------|
| Operating Band                           | SCS kHz | 5 MHz (dBm) | 10 MHz (dBm) | 15 MHz (dBm) | 20 MHz (dBm) |
| n24                                      | 15      | -97.5       | -94.3        |              |              |
|                                          | 30      |             | -94.7        |              |              |
|                                          | 60      |             | -95.0        |              |              |
| n25                                      | 15      | -94.8       | -91.6        | -89.8        | -88.5        |
|                                          | 30      |             | -92.0        | -90.0        | -88.7        |
|                                          | 60      |             | -92.3        | -90.2        | -89.0        |
| n26                                      | 15      | -95.8       | -92.6        | -90.8        | -89.5        |
|                                          | 30      |             | -93.0        | -91.0        | -89.7        |
| n28                                      | 15      | -96.8       | -93.6        | -91.8        | -90.5        |
|                                          | 30      |             | -94.0        | -92.0        | -90.7        |
| n30                                      | 15      | -97.0       | -93.8        |              |              |
|                                          | 30      |             | -94.2        |              |              |
| n65                                      | 15      | -97.5       | -94.3        | -92.5        | -91.2        |
|                                          | 30      |             | -94.7        | -92.7        | -91.4        |
|                                          | 60      |             | -95.0        | -92.9        | -91.7        |
| n66                                      | 15      | -97.5       | -94.3        | -92.5        | -91.2        |
|                                          | 30      |             | -94.7        | -92.7        | -91.4        |
|                                          | 60      |             | -95.0        | -92.9        | -91.7        |
| n70                                      | 15      | -97.5       | -94.3        | -92.5        | -91.2        |
|                                          | 30      |             | -94.7        | -92.7        | -91.4        |
|                                          | 60      |             | -95.0        | -92.9        | -91.7        |
| n71                                      | 15      | -95.5       | -92.3        | -90.5        | -89.2        |
|                                          | 30      |             | -92.7        | -90.7        | -89.4        |
| n74                                      | 15      | -97.5       | -94.3        | -92.5        | -91.2        |
|                                          | 30      |             | -94.7        | -92.7        | -91.4        |
|                                          | 60      |             | -95.0        | -92.9        | -91.7        |
| n85                                      | 15      | -95.3       | -92.1        | -90.3        |              |
|                                          | 30      |             | -92.5        | -90.5        |              |
| n91                                      | 15      | -97.5       |              |              |              |
| n92                                      | 15      | -97.5       | -94.3        | -92.5        | -91.2        |
|                                          | 30      |             | -94.7        | -92.7        | -91.4        |
| n93                                      | 15      | -97.5       |              |              |              |
| n94                                      | 15      | -97.5       | -94.3        | -92.5        | -91.2        |
|                                          | 30      |             | -94.7        | -92.7        | -91.4        |

Table 7.31.2-4: Uplink configuration for HD-FDD reference sensitivity

| Operating band / SCS / Channel bandwidth |         |       |        |        |        |
|------------------------------------------|---------|-------|--------|--------|--------|
| Operating Band                           | SCS kHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| n1                                       | 15      | 25    | 50     | 75     | 100    |
|                                          | 30      |       | 24     | 36     | 50     |
|                                          | 60      |       | 10     | 18     | 24     |
| n2                                       | 15      | 25    | 50     | 75     | 100    |
|                                          | 30      |       | 24     | 36     | 50     |
|                                          | 60      |       | 10     | 18     | 24     |
| n3                                       | 15      | 25    | 50     | 75     | 100    |
|                                          | 30      |       | 24     | 36     | 50     |
|                                          | 60      |       | 10     | 18     | 24     |
| n5                                       | 15      | 25    | 50     | 75     | 100    |
|                                          | 30      |       | 24     | 36     | 50     |
| n7                                       | 15      | 25    | 50     | 75     | 100    |
|                                          | 30      |       | 24     | 36     | 50     |
|                                          | 60      |       | 10     | 18     | 24     |
| n8                                       | 15      | 25    | 50     | 75     | 100    |
|                                          | 30      |       | 24     | 36     | 50     |
| n12                                      | 15      | 25    | 50     | 75     |        |
|                                          | 30      |       | 24     | 36     |        |
| n13                                      | 15      | 25    | 50     |        |        |
|                                          | 30      |       | 24     |        |        |
| n14                                      | 15      | 25    | 50     |        |        |
|                                          | 30      |       | 24     |        |        |
| n18                                      | 15      | 25    | 50     | 75     |        |

| Operating band / SCS / Channel bandwidth                                                                                                                                                                 |         |       |        |        |        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------|--------|--------|--------|
| Operating Band                                                                                                                                                                                           | SCS kHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| n20                                                                                                                                                                                                      | 30      |       | 24     | 36     |        |
|                                                                                                                                                                                                          | 15      | 25    | 50     | 75     | 100    |
|                                                                                                                                                                                                          | 30      |       | 24     | 36     | 50     |
| n24                                                                                                                                                                                                      | 15      | 25    | 50     |        |        |
|                                                                                                                                                                                                          | 30      |       | 24     |        |        |
|                                                                                                                                                                                                          | 60      |       | 10     |        |        |
| n25                                                                                                                                                                                                      | 15      | 25    | 50     | 75     | 100    |
|                                                                                                                                                                                                          | 30      |       | 24     | 36     | 50     |
|                                                                                                                                                                                                          | 60      |       | 10     | 18     | 24     |
| n26                                                                                                                                                                                                      | 15      | 25    | 50     | 75     | 100    |
|                                                                                                                                                                                                          | 30      |       | 24     | 36     | 50     |
| n28                                                                                                                                                                                                      | 15      | 25    | 50     | 75     | 100    |
|                                                                                                                                                                                                          | 30      |       | 24     | 36     | 50     |
| n30                                                                                                                                                                                                      | 15      | 25    | 50     |        |        |
|                                                                                                                                                                                                          | 30      |       | 24     |        |        |
| n65                                                                                                                                                                                                      | 15      | 25    | 50     | 75     | 100    |
|                                                                                                                                                                                                          | 30      |       | 24     | 36     | 50     |
|                                                                                                                                                                                                          | 60      |       | 10     | 18     | 24     |
| n66                                                                                                                                                                                                      | 15      | 25    | 50     | 75     | 100    |
|                                                                                                                                                                                                          | 30      |       | 24     | 36     | 50     |
|                                                                                                                                                                                                          | 60      |       | 10     | 18     | 24     |
| n70                                                                                                                                                                                                      | 15      | 25    | 50     | 75     | NOTE 1 |
|                                                                                                                                                                                                          | 30      |       | 24     | 36     | NOTE 1 |
|                                                                                                                                                                                                          | 60      |       | 10     | 18     | NOTE 1 |
| n71                                                                                                                                                                                                      | 15      | 25    | 50     | 75     | 100    |
|                                                                                                                                                                                                          | 30      |       | 24     | 36     | 50     |
| n74                                                                                                                                                                                                      | 15      | 25    | 50     | 75     | 100    |
|                                                                                                                                                                                                          | 30      |       | 24     | 36     | 50     |
|                                                                                                                                                                                                          | 60      |       | 10     | 18     | 24     |
| n85                                                                                                                                                                                                      | 15      | 25    | 50     | 75     |        |
|                                                                                                                                                                                                          | 30      |       | 24     | 36     |        |
| n91                                                                                                                                                                                                      | 15      | 25    |        |        |        |
| n92                                                                                                                                                                                                      | 15      | 25    | 50     | 75     | 100    |
|                                                                                                                                                                                                          | 30      |       | 24     | 36     | 50     |
| n93                                                                                                                                                                                                      | 15      | 25    |        |        |        |
| n94                                                                                                                                                                                                      | 15      | 25    | 50     | 75     | 100    |
|                                                                                                                                                                                                          | 30      |       | 24     | 36     | 50     |
| NOTE 1: For DL channel bandwidths that do not have symmetric UL channel bandwidth, highest valid UL configuration with lowest TX-RX separation (Table 5.4.4-1) shall be used unless otherwise specified. |         |       |        |        |        |

## 7.4 Maximum input level

Maximum input level is defined as the maximum mean power received at the UE antenna port, at which the specified relative throughput shall meet or exceed the minimum requirements for the specified reference measurement channel. The throughput shall be  $\geq 95$  % of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.4-1.

**Table 7.4-1: Maximum input level**

| Rx Parameter                                               | Units | Channel bandwidth (MHz) |                                                                         |                     |
|------------------------------------------------------------|-------|-------------------------|-------------------------------------------------------------------------|---------------------|
|                                                            |       | 5, 10, 15, 20           | 25, 30, 35, 40, 45, 50                                                  | 60, 70, 80, 90, 100 |
| Power in Transmission Bandwidth Configuration <sup>4</sup> | dBm   | $-25^2$                 | $-25 + 10\log_{10}(\text{BW}_{\text{Channel}} / 20)^{\text{Note } 2}$   | $-20^2$             |
|                                                            |       | $-27^{3,5}$             | $-27 + 10\log_{10}(\text{BW}_{\text{Channel}} / 20)^{\text{Note } 3,5}$ | $-22^{3,5}$         |

- NOTE 1: The transmitter shall be set to 4 dB below  $P_{\text{CMAX\_L,f,c}}$  at the minimum uplink configuration specified in Table 7.3.2-3 and 7.3F.2-3 for shared spectrum channel access operation with  $P_{\text{CMAX\_L,f,c}}$  as defined in clause 6.2.4.
- NOTE 2: Reference measurement channel is A.3.2.3 or A.3.3.3 for 64 QAM.
- NOTE 3: Reference measurement channel is A.3.2.4 or A.3.3.4 for 256 QAM.
- NOTE 4:  $10\log_{10}(x)$  is rounded to the nearest 0.5dB value.
- NOTE 5: Reference measurement channel is A.3.2.5 or A.3.3.5 for 1024 QAM.

## 7.4A Maximum input level for CA

### 7.4A.1 Maximum input level for Intra-band contiguous CA

For intra-band contiguous carrier aggregation maximum input level is defined as the maximum mean power received at the UE antenna port, over the Transmission bandwidth configuration of each CC.

The throughput shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.4A.1-1 for each component carrier.

**Table 7.4A.1-1: Maximum input level for Intra-band contiguous CA**

| Rx Parameter                                                                                                                                                                                                                                                   | Units | NR CA Bandwidth Class                                                                                                                                       |                    |                    |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|--------------------|--|
|                                                                                                                                                                                                                                                                |       | B                                                                                                                                                           | C                  | D                  |  |
| Power in largest transmission bandwidth configuration CC, $P_{\text{largest BW}}$                                                                                                                                                                              | dBm   | -23 <sup>2</sup>                                                                                                                                            | -23 <sup>2</sup>   | -25 <sup>2</sup>   |  |
|                                                                                                                                                                                                                                                                |       | -25 <sup>3,4</sup>                                                                                                                                          | -25 <sup>3,4</sup> | -27 <sup>3,4</sup> |  |
| Power in each other CC                                                                                                                                                                                                                                         | dBm   | $P_{\text{largest BW}} + 10 \cdot \log\{(N_{\text{RB,c}} \cdot \text{SCS}_{\text{c}}) / (N_{\text{RB, largest BW}} \cdot \text{SCS}_{\text{largest BW}})\}$ |                    |                    |  |
| NOTE 1: The transmitter shall be set to 4 dB below $P_{\text{CMAX\_L,f,c}}$ at the minimum uplink configuration specified in Table 7.3.2-3 and 7.3F.2-3 for shared spectrum channel access operation with $P_{\text{CMAX\_L,f,c}}$ as defined in clause 6.2.4. |       |                                                                                                                                                             |                    |                    |  |
| NOTE 2: Reference measurement channel is A.3.2.3 or A.3.3.3 for 64 QAM.                                                                                                                                                                                        |       |                                                                                                                                                             |                    |                    |  |
| NOTE 3: Reference measurement channel is A.3.2.4 or A.3.3.4 for 256 QAM.                                                                                                                                                                                       |       |                                                                                                                                                             |                    |                    |  |
| NOTE 4: Reference measurement channel is A.3.2.5 or A.3.3.5 for 1024 QAM.                                                                                                                                                                                      |       |                                                                                                                                                             |                    |                    |  |

### 7.4A.2 Maximum input level for Intra-band non-contiguous CA

For intra-band non-contiguous carrier aggregation with one uplink carrier and two or more downlink sub-blocks, each larger than or equal to 5 MHz, the maximum input level requirements are defined with the uplink configuration in accordance with 7.3A.2.2-1. For this uplink configuration, the UE shall meet the requirements for each sub-block as specified in Table 7.4-1 and Table 7.4A.1-1 for one component carrier and two component carriers per sub-block, respectively. The throughput of each downlink component carrier shall be  $\geq 95\%$  of the maximum throughput of the specified reference measurement channel as specified in Annex A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1 and A.5.2.1. The requirements apply with all downlink carriers active.

### 7.4A.3 Maximum input level for Inter-band CA

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one NR band, the maximum input level is defined with the uplink active on the band(s) other than the band whose downlink is being tested. For NR CA configurations including an operating band without uplink band or an operating band with an unpaired DL part (as noted in Table 5.2-1), the requirements for all downlinks shall be met with the single uplink carrier active in each band capable of UL operation. The UE shall meet the requirements specified in clause 7.4 for each component carrier while all downlink carriers are active.

The throughput shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1) for each component carrier.

## 7.4B Maximum input level for NR-DC

For inter-band NR-DC configurations, the maximum input level for the corresponding inter-band CA configuration as specified in clause 7.4A applies.

## 7.4D Maximum input level for UL MIMO

For UE with two transmitter antenna connectors in closed-loop spatial multiplexing, the minimum requirements specified in clause 7.4 shall be met with the UL MIMO configurations described in clause 6.2D.1 and clause 6.2F.1D for shared spectrum access operation. For UL MIMO, the parameter  $P_{\text{CMAX}_L}$  is defined as the total transmitter power over the two transmit antenna connectors.

## 7.4E Maximum input level for V2X

### 7.4E.1 General

Maximum input level is defined as the maximum mean power received at the UE antenna port, at which the specified relative throughput shall meet or exceed the minimum requirements for the specified reference measurement channel. When UE is configured for NR V2X reception non-concurrent with NR uplink transmissions for NR V2X operating bands specified in Table 5.2E.1-1, the throughput shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.7.3 and A.7.4 with parameters specified in Table 7.4E.1-1.

**Table 7.4E.1-1: Maximum input level of NR V2X**

| Rx Parameter                                                | Units | Channel bandwidth  |                  |                  |                  |                  |
|-------------------------------------------------------------|-------|--------------------|------------------|------------------|------------------|------------------|
|                                                             |       | 5 MHz <sup>3</sup> | 10 MHz           | 20 MHz           | 30 MHz           | 40 MHz           |
| Power in Transmission Bandwidth Configuration               | dBm   | -25 <sup>1</sup>   | -25 <sup>1</sup> | -25 <sup>1</sup> | -23 <sup>1</sup> | -22 <sup>1</sup> |
|                                                             |       | -27 <sup>2</sup>   | -27 <sup>2</sup> | -27 <sup>2</sup> | -25 <sup>2</sup> | -24 <sup>2</sup> |
| NOTE 1: Reference measurement channel is A.7.3 for 64 QAM.  |       |                    |                  |                  |                  |                  |
| NOTE 2: Reference measurement channel is A.7.4 for 256 QAM. |       |                    |                  |                  |                  |                  |
| NOTE 3: The CBW is only applicable for PS UE in n14.        |       |                    |                  |                  |                  |                  |

### 7.4E.2 Maximum input level for V2X concurrent operation

For the inter-band concurrent NR V2X operation, the requirements specified in clause 7.4E.1 shall apply for the NR sidelink reception in the operating bands in Table 5.2E.2-1 and the requirements specified in clause 7.4 shall apply for the NR downlink reception in licensed band while all downlink carriers are active.

## 7.5 Adjacent channel selectivity

Adjacent channel selectivity (ACS) is a measure of a receiver's ability to receive an NR signal at its assigned channel frequency in the presence of an adjacent channel signal at a given frequency offset from the centre frequency of the assigned channel. ACS is the ratio of the receive filter attenuation on the assigned channel frequency to the receive filter attenuation on the adjacent channel(s).

The UE shall fulfil the minimum requirements specified in Table 7.5-1 for NR bands with  $\text{FDL}_{\text{high}} < 2700$  MHz and  $\text{FUL}_{\text{high}} < 2700$  MHz and the minimum requirements specified in Table 7.5-2 for NR bands with  $\text{FDL}_{\text{low}} \geq 3300$  MHz and  $\text{FUL}_{\text{low}} \geq 3300$  MHz. These requirements apply for all values of an adjacent channel interferer up to -25 dBm and for any SCS specified for the channel bandwidth of the wanted signal. However, it is not possible to directly measure the ACS; instead the lower and upper range of test parameters are chosen as in Table 7.5-3 and Table 7.5-4 for verification of the requirements specified in Table 7.5-1, and as in Table 7.5-5 and Table 7.5-6 for verification of the requirements specified in Table 7.5-2. For these test parameters, the throughput shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2, and A.3.3 (with one sided



dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1). For operating bands with an unpaired DL part (as noted in Table 5.2-1), the requirements only apply for carriers assigned in the paired part.

**Table 7.5-1: ACS for NR bands with  $F_{DL\_high} < 2700$  MHz and  $F_{UL\_high} < 2700$  MHz**

| RX parameter                                               | Units | Channel bandwidth (MHz) |    |                                                 |
|------------------------------------------------------------|-------|-------------------------|----|-------------------------------------------------|
|                                                            |       | 5, 10                   | 15 | 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100 |
| ACS                                                        | dB    | 33                      | 30 | $27 - 10\log_{10}(BW_{Channel} / 20)$           |
| NOTE1: ACS value is rounded to the next higher 0.5dB value |       |                         |    |                                                 |

**Table 7.5-2: ACS for NR bands with  $F_{DL\_low} \geq 3300$  MHz and  $F_{UL\_low} \geq 3300$  MHz**

| RX parameter | Units | Channel bandwidth (MHz)                                 |
|--------------|-------|---------------------------------------------------------|
|              |       | 10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100 |
| ACS          | dB    | 33                                                      |

**Table 7.5-3: Test parameters for NR bands with  $F_{DL\_high} < 2700$  MHz and  $F_{UL\_high} < 2700$  MHz, case 1**

| RX parameter                                                                                                                                                                                                                                                                              | Units | Channel bandwidth (MHz)                                                  |                   |                                                                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------------------------------------------------------------------------|-------------------|------------------------------------------------------------------|
|                                                                                                                                                                                                                                                                                           |       | 5, 10                                                                    | 15                | 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100                  |
| Power in transmission bandwidth configuration                                                                                                                                                                                                                                             | dBm   | REFSENS + 14 dB                                                          |                   |                                                                  |
| $P_{interferer}^4$                                                                                                                                                                                                                                                                        | dBm   | REFSENS + 45.5 dB                                                        | REFSENS + 42.5 dB | REFSENS + 39.5 – 10log <sub>10</sub> (BW <sub>Channel</sub> /20) |
| BW <sub>interferer</sub>                                                                                                                                                                                                                                                                  | MHz   | 5                                                                        |                   |                                                                  |
| F <sub>interferer</sub> (offset)                                                                                                                                                                                                                                                          | MHz   | BW <sub>Channel</sub> /2 + 2.5<br>/<br>-(BW <sub>Channel</sub> /2 + 2.5) |                   |                                                                  |
| NOTE 1: The transmitter shall be set to 4 dB below P <sub>CMAX_L,f,c</sub> at the minimum UL configuration specified in Table 7.3.2-3 with P <sub>CMAX_L,f,c</sub> defined in clause 6.2.4.                                                                                               |       |                                                                          |                   |                                                                  |
| NOTE 2: The absolute value of the interferer offset F <sub>interferer</sub> (offset) shall be further adjusted to $(\lceil  F_{interferer}  / SCS \rceil + 0.5) SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz.<br>The interferer is an NR signal with 15 kHz SCS. |       |                                                                          |                   |                                                                  |
| NOTE 3: The interferer consists of the NR interferer RMC specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1.                                                                               |       |                                                                          |                   |                                                                  |
| NOTE 4: 10log <sub>10</sub> (x) is rounded to the next higher 0.5dB value.                                                                                                                                                                                                                |       |                                                                          |                   |                                                                  |

**Table 7.5-4: Test parameters for NR bands with  $F_{DL\_high} < 2700$  MHz and  $F_{UL\_high} < 2700$  MHz, case 2**

| RX parameter                                                                                                                                                                                                                                                                              | Units | Channel bandwidth (MHz)                                    |       |                                                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------------------------------------------------------------|-------|---------------------------------------------------------|
|                                                                                                                                                                                                                                                                                           |       | 5, 10                                                      | 15    | 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100         |
| Power in transmission bandwidth configuration <sup>4</sup>                                                                                                                                                                                                                                | dBm   | -56.5                                                      | -53.5 | -50.5 + 10log <sub>10</sub> (BW <sub>Channel</sub> /20) |
| P <sub>interferer</sub>                                                                                                                                                                                                                                                                   | dBm   | -25                                                        |       |                                                         |
| BW <sub>interferer</sub>                                                                                                                                                                                                                                                                  | MHz   | 5                                                          |       |                                                         |
| F <sub>interferer</sub> (offset)                                                                                                                                                                                                                                                          | MHz   | $\frac{BW_{Channel} / 2 + 2.5}{-(BW_{Channel} / 2 + 2.5)}$ |       |                                                         |
| NOTE 1: The transmitter shall be set to 24 dB below P <sub>CMAX_L,f,c</sub> at the minimum UL configuration specified in Table 7.3.2-3 with P <sub>CMAX_L,f,c</sub> defined in clause 6.2.4.                                                                                              |       |                                                            |       |                                                         |
| NOTE 2: The absolute value of the interferer offset F <sub>interferer</sub> (offset) shall be further adjusted to $(\lceil  F_{interferer}  / SCS \rceil + 0.5) SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz.<br>The interferer is an NR signal with 15 kHz SCS. |       |                                                            |       |                                                         |

NOTE 3: The interferer consists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1

NOTE 4:  $10\log_{10}(x)$  is rounded to the next higher 0.5dB value.

**Table 7.5-5: Test parameters for NR bands with  $F_{DL\_low} \geq 3300$  MHz and  $F_{UL\_low} \geq 3300$  MHz, case 1**

| RX parameter                                                                                                                                                                                                                                                                                                      | Units | Channel bandwidth (MHz)                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                   |       | 10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100 |
| Power in transmission bandwidth configuration                                                                                                                                                                                                                                                                     | dBm   | REFSENS + 14 dB                                         |
| $P_{interferer}$                                                                                                                                                                                                                                                                                                  | dBm   | REFSENS + 45.5 dB                                       |
| $BW_{interferer}$                                                                                                                                                                                                                                                                                                 | MHz   | $BW_{Channel}$                                          |
| $F_{interferer}$ (offset)                                                                                                                                                                                                                                                                                         | MHz   | $BW_{Channel}$<br>/<br>$-BW_{Channel}$                  |
| NOTE 1: The transmitter shall be set to 4 dB below $P_{CMAX\_L,f,c}$ at the minimum UL configuration specified in Table 7.3.2-3 with $P_{CMAX\_L,f,c}$ defined in clause 6.2.4.                                                                                                                                   |       |                                                         |
| NOTE 2: The absolute value of the interferer offset $F_{interferer}$ (offset) shall be further adjusted to $(\lceil  F_{interferer}  / SCS \rceil + 0.5) SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz.<br>The interferer is an NR signal with an SCS equal to that of the wanted signal. |       |                                                         |
| NOTE 3: The interferer consists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1.                                                                                                                     |       |                                                         |

**Table 7.5-6: Test parameters for NR bands with  $F_{DL\_low} \geq 3300$  MHz and  $F_{UL\_low} \geq 3300$  MHz, case 2**

| RX parameter                                                                                                                                                                                                                                                                                                      | Units | Channel bandwidth (MHz)                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                   |       | 10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100 |
| Power in transmission bandwidth configuration                                                                                                                                                                                                                                                                     | dBm   | -56.5                                                   |
| $P_{interferer}$                                                                                                                                                                                                                                                                                                  | dBm   | -25                                                     |
| $BW_{interferer}$                                                                                                                                                                                                                                                                                                 | MHz   | $BW_{Channel}$                                          |
| $F_{interferer}$ (offset)                                                                                                                                                                                                                                                                                         | MHz   | $BW_{Channel}$<br>/<br>$-BW_{Channel}$                  |
| NOTE 1: The transmitter shall be set to 24 dB below $P_{CMAX\_L,f,c}$ at the minimum UL configuration specified in Table 7.3.2-3 with $P_{CMAX\_L,f,c}$ defined in clause 6.2.4.                                                                                                                                  |       |                                                         |
| NOTE 2: The absolute value of the interferer offset $F_{interferer}$ (offset) shall be further adjusted to $(\lceil  F_{interferer}  / SCS \rceil + 0.5) SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz.<br>The interferer is an NR signal with an SCS equal to that of the wanted signal. |       |                                                         |
| NOTE 3: The interferer consists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1.                                                                                                                     |       |                                                         |

## 7.5A Adjacent channel selectivity for CA

### 7.5A.1 Adjacent channel selectivity for Intra-band contiguous CA

For intra-band contiguous carrier aggregation the downlink SCC(s) shall be configured at nominal channel spacing to the PCC. The UE shall fulfil the minimum requirement specified in Table 7.5A.1-1 and 7.5A.1-1a for an adjacent channel interferer on either side of the aggregated downlink signal at a specified frequency offset and for an interferer power up to -25 dBm.

The throughput of each carrier shall be  $\geq 95$  % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.5A.1-2, 7.5A.1-2a, 7.5A.1-3 and 7.5A.1-3a.

**Table 7.5A.1-1: ACS for intra-band contiguous CA with  $F_{DL\_low} \geq 3300$  MHz and  $F_{UL\_low} \geq 3300$  MHz**

| Rx Parameter | Units | NR CA bandwidth class |      |      |  |
|--------------|-------|-----------------------|------|------|--|
|              |       | B                     | C    | D    |  |
| ACS          | dB    | 26.0                  | 33.0 | 25.2 |  |

**Table 7.5A.1-1a: ACS for intra-band contiguous CA with  $F_{DL\_high} < 2700$  MHz and  $F_{UL\_high} < 2700$  MHz**

| Rx Parameter | Units | NR CA bandwidth class |      |
|--------------|-------|-----------------------|------|
|              |       | B                     | C    |
| ACS          | dB    | 20.0                  | 17.0 |

**Table 7.5A.1-2: Test parameters for intra-band contiguous CA with  $F_{DL\_low} \geq 3300$  MHz and  $F_{UL\_low} \geq 3300$  MHz, case 1**

| Rx Parameter                                                                                                                                                                                                                                                                                                                         | Units | NR CA bandwidth class                        |                                                                              |                                              |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------------------------------------------|------------------------------------------------------------------------------|----------------------------------------------|--|
|                                                                                                                                                                                                                                                                                                                                      |       | B                                            | C                                                                            | D                                            |  |
| Pw in Transmission Bandwidth Configuration, per CC                                                                                                                                                                                                                                                                                   | dBm   | REFSENS + 14 dB                              | REFSENS + 14 dB                                                              | REFSENS + 14 dB                              |  |
| $P_{interferer}$                                                                                                                                                                                                                                                                                                                     | dBm   | Aggregated power + 24.5 dB                   | Aggregated power + 31.5 dB                                                   | Aggregated power + 23.7 dB                   |  |
| $BW_{interferer}$                                                                                                                                                                                                                                                                                                                    | MHz   | 20                                           | $BW_{channel\ CA}$                                                           | 50                                           |  |
| $F_{interferer}$ (offset)                                                                                                                                                                                                                                                                                                            | MHz   | $10 + F_{offset}$<br>/<br>$-10 - F_{offset}$ | $BW_{channel\ CA}/2 + F_{offset}$<br>/<br>$-BW_{channel\ CA}/2 + F_{offset}$ | $25 + F_{offset}$<br>/<br>$-25 - F_{offset}$ |  |
| NOTE 1: The transmitter shall be set to 4 dB below $P_{CMAX\_L,f,c}$ at the minimum UL configuration specified in Table 7.3.2-3 with $P_{CMAX\_L,f,c}$ defined in clause 6.2.4 .                                                                                                                                                     |       |                                              |                                                                              |                                              |  |
| NOTE 2: The absolute value of the interferer offset $F_{interferer}$ (offset) shall be further adjusted to $(\lceil  F_{interferer}  / SCS \rceil + 0.5) SCS$ MHz with SCS the sub-carrier spacing of the carrier closest to the interferer in MHz. The interferer is an NR signal with an SCS equal to that of the closest carrier. |       |                                              |                                                                              |                                              |  |
| NOTE 3: The interferer consists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1.                                                                                                                                        |       |                                              |                                                                              |                                              |  |

**Table 7.5A.1-2a: Test parameters for intra-band contiguous CA with  $F_{DL\_high} < 2700$  MHz and  $F_{UL\_high} < 2700$  MHz, case 1**

| Rx Parameter                                                                                                                                                                                                                                                                                        | Units | NR CA bandwidth class                          |                                                |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------------------------------------------------|------------------------------------------------|
|                                                                                                                                                                                                                                                                                                     |       | B                                              | C                                              |
| Pw in Transmission Bandwidth Configuration, per CC                                                                                                                                                                                                                                                  | dBm   | REFSENS + 14 dB                                | REFSENS + 14 dB                                |
| $P_{interferer}$                                                                                                                                                                                                                                                                                    | dBm   | Aggregated power + 18.5 dB                     | Aggregated power + 15.5 dB                     |
| $BW_{interferer}$                                                                                                                                                                                                                                                                                   | MHz   | 5                                              | 5                                              |
| $F_{interferer}$ (offset)                                                                                                                                                                                                                                                                           | MHz   | $2.5 + F_{offset}$<br>/<br>$-2.5 - F_{offset}$ | $2.5 + F_{offset}$<br>/<br>$-2.5 - F_{offset}$ |
| NOTE 1: The transmitter shall be set to 4 dB below $P_{CMAX\_L,f,c}$ at the minimum UL configuration specified in Table 7.3.2-3 with $P_{CMAX\_L,f,c}$ defined in clause 6.2.4 .                                                                                                                    |       |                                                |                                                |
| NOTE 2: The absolute value of the interferer offset $F_{interferer}$ (offset) shall be further adjusted to $(\lceil  F_{interferer}  / SCS \rceil + 0.5) SCS$ MHz with SCS the sub-carrier spacing of the carrier closest to the interferer in MHz. The interferer is an NR signal with 15 kHz SCS. |       |                                                |                                                |
| NOTE 3: The interferer consists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1.                                                                                                       |       |                                                |                                                |

**Table 7.5A.1-3: Test parameters for intra-band contiguous CA with  $F_{DL\_low} \geq 3300$  MHz and  $F_{UL\_low} \geq 3300$  MHz, case 2**

| Rx Parameter | Units | NR CA bandwidth class |   |   |
|--------------|-------|-----------------------|---|---|
|              |       | B                     | C | D |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |                                        |                                                                      |                                        |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------|----------------------------------------------------------------------|----------------------------------------|--|
| Pw in Transmission Bandwidth Configuration, per CC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | dBm | $-49.5 + 10\log(N_{RB,c}/N_{RB\_agg})$ | -56.5                                                                | $-48.7 + 10\log(N_{RB,c}/N_{RB\_agg})$ |  |
| $P_{interferer}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | dBm | -25                                    | -25                                                                  | -25                                    |  |
| $BW_{interferer}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | MHz | 20                                     | $BW_{channel\ CA}$                                                   | 50                                     |  |
| $F_{interferer}$ (offset)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | MHz | $10 + F_{offset} / -10 - F_{offset}$   | $BW_{channel\ CA}/2 + F_{offset} / -BW_{channel\ CA}/2 + F_{offset}$ | $25 + F_{offset} / -25 - F_{offset}$   |  |
| <p>NOTE 1: The transmitter shall be set to 24 dB below <math>P_{CMAX\_L,f,c}</math> at the minimum UL configuration specified in Table 7.3.2-3 with <math>P_{CMAX\_L,f,c}</math> defined in clause 6.2.4.</p> <p>NOTE 2: The absolute value of the interferer offset <math>F_{interferer}</math> (offset) shall be further adjusted to <math>(\lceil F_{interferer} / SCS \rceil + 0.5) SCS</math> MHz with SCS the sub-carrier spacing of the carrier closest to the interferer in MHz. The interferer is an NR signal with an SCS equal to that of the closest carrier.</p> <p>NOTE 3: The interferer consists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1.</p> |     |                                        |                                                                      |                                        |  |

**Table 7.5A.1-3a: Test parameters for intra-band contiguous CA with  $F_{DL\_high} < 2700$  MHz and  $F_{UL\_high} < 2700$  MHz, case 2**

| Rx Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Units | NR CA Bandwidth Class                  |                                        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------------------------------------|----------------------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       | B                                      | C                                      |
| Pw in Transmission Bandwidth Configuration, per CC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | dBm   | $-43.5 + 10\log(N_{RB,c}/N_{RB\_agg})$ | $-40.5 + 10\log(N_{RB,c}/N_{RB\_agg})$ |
| $P_{interferer}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | dBm   | -25                                    | -25                                    |
| $BW_{interferer}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | MHz   | 5                                      | 5                                      |
| $F_{interferer}$ (offset)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | MHz   | $2.5 + F_{offset} / -2.5 - F_{offset}$ | $2.5 + F_{offset} / -2.5 - F_{offset}$ |
| <p>NOTE 1: The transmitter shall be set to 24 dB below <math>P_{CMAX\_L,f,c}</math> at the minimum UL configuration specified in Table 7.3.2-3 with <math>P_{CMAX\_L,f,c}</math> defined in clause 6.2.4.</p> <p>NOTE 2: The absolute value of the interferer offset <math>F_{interferer}</math> (offset) shall be further adjusted to <math>(\lceil F_{interferer} / SCS \rceil + 0.5) SCS</math> MHz with SCS the sub-carrier spacing of the carrier closest to the interferer in MHz. The interferer is an NR signal with 15 kHz SCS.</p> <p>NOTE 3: The interferer consists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1.</p> |       |                                        |                                        |

## 7.5A.2 Adjacent channel selectivity Intra-band non-contiguous CA

For intra-band non-contiguous carrier aggregation with  $F_{DL\_high} < 2700$  MHz and  $F_{UL\_high} < 2700$  MHz with one uplink carrier and two or more downlink sub-blocks, each larger than or equal to 5 MHz, the adjacent channel selectivity requirements are defined with the uplink configuration in accordance with Table 7.3A.2.2-1. For this uplink configuration, the UE shall meet the requirements for each sub-block as specified in clauses 7.5 and 7.5A.1 for one component carrier and two component carriers per sub-block, respectively. The UE shall fulfil the minimum requirements all values of a single adjacent channel interferer in-gap and out-of-gap up to a -25 dBm interferer power while all downlink carriers are active. For the lower range of test parameters (Case 1), the interferer power  $P_{interferer}$  shall be set to the maximum of the levels given by the carriers of the respective sub-blocks as specified in Table 7.5-3 and Table 7.5A.1-2a for one component carrier and two component carriers per sub-block, respectively. The wanted signal power levels for the carriers of each sub-block shall then be adjusted relative to  $P_{interferer}$  in accordance with the ACS requirement for each sub-block (Table 7.5-1 and Table 7.5A.1-1a). For the upper range of test parameters (Case 2) for which the interferer power  $P_{interferer}$  is -25 dBm (Table 7.5-4 and Table 7.5A.1-3a) the wanted signal power levels for the carriers of each sub-block shall be adjusted relative to  $P_{interferer}$  like for Case 1.

For intra-band non-contiguous carrier aggregation with  $F_{DL\_low} \geq 3300$  MHz and  $F_{UL\_low} \geq 3300$  MHz with one uplink carrier and two or more downlink sub-blocks, each larger than or equal to 5 MHz, the adjacent channel selectivity requirements are defined with the uplink configuration in accordance with Table 7.3A.2.2-1. For this uplink configuration, the UE shall meet the requirements for each sub-block as specified in clauses 7.5 and 7.5A.1 for one component carrier and two component carriers per sub-block, respectively. The UE shall fulfil the minimum requirements all values of a single adjacent channel interferer in-gap and out-of-gap up to a -25 dBm interferer power while all downlink carriers are active. For the lower range of test parameters (Case 1), the interferer power  $P_{interferer}$  shall

be set to the maximum of the levels given by the carriers of the respective sub-blocks as specified in Table 7.5-5 and Table 7.5A.1-2 for one component carrier and two component carriers per sub-block, respectively. The wanted signal power levels for the carriers of each sub-block shall then be adjusted relative to  $P_{\text{interferer}}$  in accordance with the ACS requirement for each sub-block (Table 7.5-2 and Table 7.5A.1-1). For the upper range of test parameters (Case 2) for which the interferer power  $P_{\text{interferer}}$  is -25 dBm (Table 7.5-6 and Table 7.5A.1-3) the wanted signal power levels for the carriers of each sub-block shall be adjusted relative to  $P_{\text{interferer}}$  like for Case 1.

The throughput of each carrier shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).

### 7.5A.3 Adjacent channel selectivity Inter-band CA

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one NR band, the adjacent channel requirements are defined with the uplink active on the band(s) other than the band whose downlink is being tested. For NR CA configurations including an operating band without uplink operation or an operating band with an unpaired DL part (as noted in Table 5.2-1), the requirements for all downlinks shall be met with the single uplink carrier active in each band capable of UL operation. The UE shall meet the requirements specified in clause 7.5 and clause 7.5F when the downlink belongs to a spectrum sharing defined band, for each component carrier while all downlink carriers are active.

The throughput of each carrier shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).

## 7.5B Adjacent channel selectivity for NR-DC

For inter-band NR-DC configurations, the adjacent channel selectivity for the corresponding inter-band CA configuration as specified in clause 7.5A applies.

## 7.5D Adjacent channel selectivity for UL MIMO

For UE(s) with two transmitter antenna connectors in closed-loop spatial multiplexing scheme, the minimum requirements specified in clause 7.5 shall be met with the UL MIMO configurations described in clause 6.2D.1 and clause 6.2F.1D for shared spectrum access operation. For UL MIMO, the parameter  $P_{\text{CMAX}_L}$  is defined as the total transmitter power over the two transmit antenna connectors.

## 7.5E Adjacent channel selectivity for V2X

### 7.5E.1 General

Adjacent channel selectivity (ACS) is a measure of a receiver's ability to receive an NR signal at its assigned channel frequency in the presence of an adjacent channel signal at a given frequency offset from the centre frequency of the assigned channel. ACS is the ratio of the receive filter attenuation on the assigned channel frequency to the receive filter attenuation on the adjacent channel(s).

The UE shall fulfil the minimum requirements specified in Table 7.5E.1-1 for NR V2X UE. These requirements apply for all values of an adjacent channel interferer up to -25 dBm and for any SCS specified for the channel bandwidth of the wanted signal. However, it is not possible to directly measure the ACS; instead the lower and upper range of test parameters are chosen as in Table 7.5E.1-2 and Table 7.5E.1-3 for verification of the requirements specified in Table 7.5E.1-1. For these test parameters, when UE is configured for NR V2X reception non-concurrent with NR uplink transmissions for NR V2X operating bands specified in Table 5.2E.1-1, the throughput shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.7.2.

In licensed band, the minimum requirements shall reuse the same ACS values with NR UE.

**Table 7.5E.1-1: Adjacent channel selectivity for NR V2X**

| RX parameter | Units | Channel bandwidth |
|--------------|-------|-------------------|
|--------------|-------|-------------------|

|                                                      |    | 5 MHz <sup>1</sup> | 10 MHz | 20 MHz | 30 MHz | 40 MHz |
|------------------------------------------------------|----|--------------------|--------|--------|--------|--------|
| ACS                                                  | dB | 33.0               | 33.0   | 27.0   | 25.5   | 24.0   |
| NOTE 1: The CBW is only applicable for PS UE in n14. |    |                    |        |        |        |        |

**Table 7.5E.1-2: Test parameters for Adjacent channel selectivity for V2X, Case 1**

| RX parameter                                                                                                                                                                                                                                                                                                | Units | Channel bandwidth                           |                                             |                                             |                                             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|
|                                                                                                                                                                                                                                                                                                             |       | 10 MHz                                      | 20 MHz                                      | 30 MHz                                      | 40 MHz                                      |
| Power in transmission bandwidth configuration                                                                                                                                                                                                                                                               | dBm   | $P_{\text{REFSENS\_V2X}} + 14 \text{ dB}$   |                                             |                                             |                                             |
| $P_{\text{interferer}}$                                                                                                                                                                                                                                                                                     | dBm   | $P_{\text{REFSENS\_V2X}} + 45.5 \text{ dB}$ | $P_{\text{REFSENS\_V2X}} + 39.5 \text{ dB}$ | $P_{\text{REFSENS\_V2X}} + 38.0 \text{ dB}$ | $P_{\text{REFSENS\_V2X}} + 36.5 \text{ dB}$ |
| $BW_{\text{interferer}}$                                                                                                                                                                                                                                                                                    | MHz   | 10                                          | 10                                          | 10                                          | 10                                          |
| $F_{\text{interferer}} \text{ (offset)}$                                                                                                                                                                                                                                                                    | MHz   | 10 / -10                                    | 15 / -15                                    | 20 / -20                                    | 25 / -25                                    |
| NOTE 1: The interferer is QPSK modulated PUSCH containing data and reference symbols. Normal cyclic prefix is used.                                                                                                                                                                                         |       |                                             |                                             |                                             |                                             |
| NOTE 2: The absolute value of the interferer offset $F_{\text{interferer}}$ (offset) shall be further adjusted to $(\lceil  F_{\text{interferer}}  / \text{SCS} \rceil + 0.5) \text{SCS}$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS. |       |                                             |                                             |                                             |                                             |

**Table 7.5E.1-2a: Test parameters for Adjacent channel selectivity in n14, Case 1**

| RX parameter                                                                                                                                                                                                                                                                                               | Units | Channel bandwidth                  |                                    |        |        |        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------------------------------------|------------------------------------|--------|--------|--------|
|                                                                                                                                                                                                                                                                                                            |       | 5 MHz                              | 10 MHz                             | 20 MHz | 30 MHz | 40 MHz |
| Power in transmission bandwidth configuration                                                                                                                                                                                                                                                              | dBm   | P <sub>REFSENS_V2X</sub> + 14 dB   |                                    |        |        |        |
| P <sub>interferer</sub>                                                                                                                                                                                                                                                                                    | dBm   | P <sub>REFSENS_V2X</sub> + 45.5 dB | P <sub>REFSENS_V2X</sub> + 45.5 dB |        |        |        |
| BW <sub>interferer</sub>                                                                                                                                                                                                                                                                                   | MHz   | 5                                  | 5                                  |        |        |        |
| F <sub>interferer</sub> (offset)                                                                                                                                                                                                                                                                           | MHz   | 5 / -5                             | 7.5 / -7.5                         |        |        |        |
| NOTE 1: The interferer is QPSK modulated PUSCH containing data and reference symbols. Normal cyclic prefix is used.                                                                                                                                                                                        |       |                                    |                                    |        |        |        |
| NOTE 2: The absolute value of the interferer offset F <sub>interferer</sub> (offset) shall be further adjusted to $\lceil  F_{\text{interferer}}  / \text{SCS} \rceil + 0.5 \text{ SCS}$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS. |       |                                    |                                    |        |        |        |

**Table 7.5E.1-3: Test parameters for Adjacent channel selectivity for V2X, Case 2**

| RX parameter                                                                                                                                                                                                                                                                                                | Units | Channel bandwidth |          |          |          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------|----------|----------|----------|
|                                                                                                                                                                                                                                                                                                             |       | 10 MHz            | 20 MHz   | 30 MHz   | 40 MHz   |
| Power in transmission bandwidth configuration                                                                                                                                                                                                                                                               | dBm   | -56.5             | -50.5    | -49.0    | -47.5    |
| $P_{\text{interferer}}$                                                                                                                                                                                                                                                                                     | dBm   | -25               |          |          |          |
| $BW_{\text{interferer}}$                                                                                                                                                                                                                                                                                    | MHz   | 10                | 10       | 10       | 10       |
| $F_{\text{interferer}} \text{ (offset)}$                                                                                                                                                                                                                                                                    | MHz   | 10 / -10          | 15 / -15 | 20 / -20 | 25 / -25 |
| NOTE 1: The interferer is QPSK modulated PUSCH containing data and reference symbols. Normal cyclic prefix is used.                                                                                                                                                                                         |       |                   |          |          |          |
| NOTE 2: The absolute value of the interferer offset $F_{\text{interferer}}$ (offset) shall be further adjusted to $(\lceil  F_{\text{interferer}}  / \text{SCS} \rceil + 0.5) \text{SCS}$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS. |       |                   |          |          |          |

**Table 7.5E.1-3a: Test parameters for Adjacent channel selectivity in n14, Case 2**

| RX parameter                                  | Unit<br>s | Channel bandwidth |        |        |        |        |
|-----------------------------------------------|-----------|-------------------|--------|--------|--------|--------|
|                                               |           | 5 MHz             | 10 MHz | 20 MHz | 30 MHz | 40 MHz |
| Power in transmission bandwidth configuration | dBm       | -56.5             | -56.5  |        |        |        |

|                                                                                                                                                                                                                                                                                                       |     |        |            |  |  |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------|------------|--|--|--|
| $P_{\text{interferer}}$                                                                                                                                                                                                                                                                               | dBm | -25    |            |  |  |  |
| $BW_{\text{interferer}}$                                                                                                                                                                                                                                                                              | MHz | 5      | 5          |  |  |  |
| $F_{\text{interferer}} \text{ (offset)}$                                                                                                                                                                                                                                                              | MHz | 5 / -5 | 7.5 / -7.5 |  |  |  |
| NOTE 1: The interferer is QPSK modulated PUSCH containing data and reference symbols. Normal cyclic prefix is used.                                                                                                                                                                                   |     |        |            |  |  |  |
| NOTE 2: The absolute value of the interferer offset $F_{\text{interferer}} \text{ (offset)}$ shall be further adjusted to $(\lceil  F_{\text{interferer}}  / SCS \rceil + 0.5) SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS. |     |        |            |  |  |  |

## 7.5E.2 Adjacent channel selectivity for V2X concurrent operation

For the inter-band concurrent NR V2X operation, the requirements specified in clause 7.5E.1 shall apply for the NR sidelink reception in the operating bands in Table 5.2E.2-1 and the requirements specified in clause 7.5 shall apply for the NR downlink reception in licensed band while all downlink carriers are active.

## 7.5F Adjacent channel selectivity for shared spectrum channel access

### 7.5F.1 General

Adjacent channel selectivity (ACS) is a measure of a receiver's ability to receive an NR signal at its assigned channel frequency in the presence of an adjacent channel signal at a given frequency offset from the centre frequency of the assigned channel. ACS is the ratio of the receive filter attenuation on the assigned channel frequency to the receive filter attenuation on the adjacent channel(s).

Instead of the general ACS requirements specified in clause 7.5, the UE shall fulfil the minimum requirements specified in Table 7.5F.1-1. These requirements apply for any SCS specified for the channel bandwidth of the wanted signal. For the test parameters specified in Table 7.5F.1-2, the throughput shall be  $\geq 95$  % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).

**Table 7.5F.1-1: ACS for shared spectrum channel access bands**

| RX parameter                                               | Units | Channel bandwidth                            |
|------------------------------------------------------------|-------|----------------------------------------------|
|                                                            |       | 20, 40, 60, 80, 100 MHz                      |
| ACS                                                        | dB    | $24 - 10\log_{10}(BW_{\text{Channel}} / 20)$ |
| NOTE1: ACS value is rounded to the next higher 0.5dB value |       |                                              |

**Table 7.5F.1-2: Test parameters for shared spectrum channel access bands**

| RX parameter                                                                                                                                                                                                                                                                                                                         | Units | Channel bandwidth                                              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                                      |       | 20, 40, 60, 80, 100 MHz                                        |
| Power in transmission bandwidth configuration                                                                                                                                                                                                                                                                                        | dBm   | REFSENS + 14 dB                                                |
| $P_{\text{interferer}}$                                                                                                                                                                                                                                                                                                              | dBm   | REFSENS + 36.5 dB – $10\log_{10}(BW_{\text{Channel}} / 20)$ dB |
| $BW_{\text{interferer}}$                                                                                                                                                                                                                                                                                                             | MHz   | 20                                                             |
| $F_{\text{interferer}} \text{ (offset)}$                                                                                                                                                                                                                                                                                             | MHz   | 20 / -20                                                       |
| NOTE 1: The transmitter shall be set to 4 dB below $P_{\text{CMAX\_L,f,c}}$ at the minimum UL configuration specified in Table 7.3.2-3 with $P_{\text{CMAX\_L,f,c}}$ defined in clause 6.2.4.                                                                                                                                        |       |                                                                |
| NOTE 2: The absolute value of the interferer offset $F_{\text{interferer}} \text{ (offset)}$ shall be further adjusted to $(\lceil  F_{\text{interferer}}  / SCS \rceil + 0.5) SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with an SCS equal to that of the wanted signal. |       |                                                                |

NOTE 3: The interferer consists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1.

## 7.5F.1A Adjacent channel selectivity for shared spectrum channel access CA

### 7.5F.1A.1 Intra-band contiguous shared spectrum channel access CA

ACS for intra-band contiguous shared access CA requirements are specified in Table 7.5F.1A.1-1. These requirements apply for any SCS specified for the channel bandwidth of the wanted signal. For the test parameters specified in Table 7.5F.1A.1-2, the throughput of each carrier shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).

**Table 7.5F.1A.1-1: ACS for intra-band contiguous shared access CA**

|                                                             |       | NR-U CA bandwidth class                       |   |   |   |   |   |   |   |
|-------------------------------------------------------------|-------|-----------------------------------------------|---|---|---|---|---|---|---|
| Rx Parameter                                                | Units | B                                             | C | D | E | I | M | N | O |
| ACS                                                         | dB    | $24 - 10\log_{10}(BW_{\text{Channel CA}}/20)$ |   |   |   |   |   |   |   |
| NOTE 1: ACS value is rounded to the next higher 0.5dB value |       |                                               |   |   |   |   |   |   |   |

**Table 7.5F.1A.1-2: Test parameters for intra-band contiguous NR-U CA**

| Rx Parameter                                                                                                                                                                                                                                                                                                                                                     | Units | NR-U CA bandwidth class                                               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                                                                  |       | B, C, D, E, M, N, O                                                   |
| Pw in Transmission Bandwidth Configuration, per CC                                                                                                                                                                                                                                                                                                               | dBm   | REFSENS + 14 dB                                                       |
| $P_{\text{Interferer}}$                                                                                                                                                                                                                                                                                                                                          | dBm   | Aggregated power + $22.5 - 10\log_{10}(BW_{\text{Channel CA}}/20)$ dB |
| $BW_{\text{Interferer}}$                                                                                                                                                                                                                                                                                                                                         | MHz   | 20                                                                    |
| $F_{\text{Interferer}}$ (offset)                                                                                                                                                                                                                                                                                                                                 | MHz   | $10 + \text{Foffset}$<br>/<br>$-10 - \text{Foffset}$                  |
| NOTE 1: The transmitter shall be set to 4 dB below $P_{\text{CMAX\_L,f,c}}$ at the minimum UL configuration specified in Table 7.3F.2-3 with $P_{\text{CMAX\_L,f,c}}$ defined in clause 6.2.4 .                                                                                                                                                                  |       |                                                                       |
| NOTE 2: The absolute value of the interferer offset $F_{\text{Interferer}}$ (offset) shall be further adjusted to $(\lceil  F_{\text{Interferer}}  / \text{SCS} \rceil + 0.5) \text{SCS}$ MHz with SCS the sub-carrier spacing of the carrier closest to the interferer in MHz. The interferer is an NR signal with an SCS equal to that of the closest carrier. |       |                                                                       |
| NOTE 3: The interferer consists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1.                                                                                                                                                                    |       |                                                                       |

### 7.5F.2 Void

## 7.6 Blocking characteristics

### 7.6.1 General

The blocking characteristic is a measure of the receiver's ability to receive a wanted signal at its assigned channel frequency in the presence of an unwanted interferer on frequencies other than those of the spurious response or the adjacent channels, without this unwanted input signal causing a degradation of the performance of the receiver beyond a specified limit. The blocking performance shall apply at all frequencies except those at which a spurious response occurs.



For shared spectrum channel access and band combinations with operating bands intended for shared spectrum channel access, the blocking characteristics is specified in clause 7.6F.

## 7.6.2 In-band blocking

For NR bands with  $F_{DL\_high} < 2700$  MHz and  $F_{UL\_high} < 2700$  MHz in-band blocking (IBB) is defined for an unwanted interfering signal falling into the UE receive band or into the first 15 MHz below or above the UE receive band. The throughput of the wanted signal shall be  $\geq 95$  % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.6.2-1 and Table 7.6.2-2. The relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal. For operating bands with an unpaired DL part (as noted in Table 5.2-1), the requirements only apply for carriers assigned in the paired part.

**Table 7.6.2-1: In-band blocking parameters for NR bands with  $F_{DL\_high} < 2700$  MHz and  $F_{UL\_high} < 2700$  MHz**

| RX parameter                                                                                                                                                                                                 | Units | Channel bandwidth (MHz) |                |                                                                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------------|----------------|--------------------------------------------------------------------|
|                                                                                                                                                                                                              |       | 5, 10                   | 15             | 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100                    |
| Power in transmission bandwidth configuration <sup>3</sup>                                                                                                                                                   | dBm   | REFSENS + 6 dB          | REFSENS + 7 dB | REFSENS + (9 + 10log <sub>10</sub> (BW <sub>Channel</sub> /20)) dB |
| BW <sub>interferer</sub>                                                                                                                                                                                     | MHz   | 5                       |                |                                                                    |
| F <sub>offset, case 1</sub>                                                                                                                                                                                  | MHz   | 7.5                     |                |                                                                    |
| F <sub>offset, case 2</sub>                                                                                                                                                                                  | MHz   | 12.5                    |                |                                                                    |
| NOTE 1: The transmitter shall be set to 4 dB below P <sub>CMAX_L,f,c</sub> at the minimum UL configuration specified in Table 7.3.2-3 with P <sub>CMAX_L,f,c</sub> defined in clause 6.2.4.                  |       |                         |                |                                                                    |
| NOTE 2: The interferer consists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1 and 15 kHz SCS. |       |                         |                |                                                                    |
| NOTE 3: 10log <sub>10</sub> (x) is rounded to the next higher 0.5dB value.                                                                                                                                   |       |                         |                |                                                                    |

**Table 7.6.2-2: In-band blocking for NR bands with  $F_{DL\_high} < 2700$  MHz and  $F_{UL\_high} < 2700$  MHz**

| NR band                                                                                                                                                                                                     | Parameter                        | Unit | Case 1                                                                                                                   | Case 2                                                                                                                       | Case 3 | Case 4                       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|------|--------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|--------|------------------------------|
|                                                                                                                                                                                                             | P <sub>interferer</sub>          | dBm  | -56                                                                                                                      | -44                                                                                                                          | -15    | -38                          |
|                                                                                                                                                                                                             | F <sub>interferer</sub> (offset) | MHz  | -BW <sub>Channel</sub> /2 – F <sub>offset, case 1</sub><br>and<br>BW <sub>Channel</sub> /2 + F <sub>offset, case 1</sub> | ≤ -BW <sub>Channel</sub> /2 – F <sub>offset, case 2</sub><br>and<br>≥ BW <sub>Channel</sub> /2 + F <sub>offset, case 2</sub> |        | -BW <sub>Channel</sub> /2-11 |
| n1, n2, n3, n5, n7, n8, n12, n13, n14, n18, n20, n24, n25, n26, n28, n29, n34, n38, n39, n40, n41, n48 <sup>3</sup> , n50, n51, n53, n65, n66, n67, n70, n74, n75, n76, n85, n91, n92, n93, n94, n100, n101 | F <sub>interferer</sub>          | MHz  | NOTE 2                                                                                                                   | F <sub>DL_low</sub> – 15<br>to<br>F <sub>DL_high</sub> + 15                                                                  |        |                              |
| n30                                                                                                                                                                                                         | F <sub>interferer</sub>          | MHz  | NOTE 2                                                                                                                   | F <sub>DL_low</sub> – 15<br>to<br>F <sub>DL_high</sub> + 15                                                                  |        | F <sub>DL_low</sub> – 11     |

| n71                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | $F_{\text{interferer}}$ | MHz | NOTE 2 | $F_{\text{DL\_low}} - 12$ to $F_{\text{DL\_high}} + 15$ | $F_{\text{DL\_low}} - 12$ |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----|--------|---------------------------------------------------------|---------------------------|--|
| <p>NOTE 1: The absolute value of the interferer offset <math>F_{\text{interferer}}</math> (offset) shall be further adjusted to <math>(\lceil  F_{\text{interferer}}  / \text{SCS} \rceil + 0.5) \text{SCS}</math> MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.</p> <p>NOTE 2: For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: <math>-BW_{\text{Channel}}/2 - F_{\text{offset, case 1}}</math>; b: <math>BW_{\text{Channel}}/2 + F_{\text{offset, case 1}}</math></p> <p>NOTE 3: n48 follows the requirement in this frequency range according to the general requirement defined in Clause 7.1.</p> <p>NOTE 4: For SDL bands, requirements shall be applied only for CA band combination cases.</p> |                         |     |        |                                                         |                           |  |

For NR bands with  $F_{\text{DL\_low}} \geq 3300$  MHz and  $F_{\text{UL\_low}} \geq 3300$  MHz in-band blocking (IBB) is defined for an unwanted interfering signal falling into the UE receive band or into an immediately adjacent frequency range up to  $3 \cdot BW_{\text{Channel}}$  below or above the UE receive band where  $BW_{\text{Channel}}$  is the bandwidth of the wanted signal. The throughput of the wanted signal shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1)] with parameters specified in Table 7.6.2-3 and Table 7.6.2-4. The relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal.

**Table 7.6.2-3: In-band blocking parameters for NR bands with  $F_{\text{DL\_low}} \geq 3300$  MHz and  $F_{\text{UL\_low}} \geq 3300$  MHz**

| RX parameter                                                                                                                                                                                  | Units | Channel bandwidth (MHz)                                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------------------------------------------------------|
|                                                                                                                                                                                               |       | 10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100 |
| Power in transmission bandwidth configuration                                                                                                                                                 | dBm   | REFSENS + 6 dB <sup>3</sup>                             |
| $BW_{\text{interferer}}$                                                                                                                                                                      | MHz   | $BW_{\text{Channel}}$                                   |
| $F_{\text{offset, case 1}}$                                                                                                                                                                   | MHz   | $(3/2) \cdot BW_{\text{Channel}}$                       |
| $F_{\text{offset, case 2}}$                                                                                                                                                                   | MHz   | $(5/2) \cdot BW_{\text{Channel}}$                       |
| NOTE 1: The transmitter shall be set to 4 dB below $P_{\text{CMAX\_L,f,c}}$ at the minimum UL configuration specified in Table 7.3.2-3 with $P_{\text{CMAX\_L,f,c}}$ defined in clause 6.2.4. |       |                                                         |
| NOTE 2: The interferer consists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1  |       |                                                         |
| NOTE 3: For Band n104, the power in transmission bandwidth configuration is REFSENS + 9 dB                                                                                                    |       |                                                         |

**Table 7.6.2-4: In-band blocking for NR bands with  $F_{\text{DL\_low}} \geq 3300$  MHz and  $F_{\text{UL\_low}} \geq 3300$  MHz**

| NR band                                                                                                                                                                                                                                                                                                                                    | Parameter                        | Unit | Case 1                                                                                                             | Case 2                                                                                                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|------|--------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                                            | $P_{\text{interferer}}$          | dBm  | -56                                                                                                                | -44                                                                                                                          |
| n77, n78, n79, n104                                                                                                                                                                                                                                                                                                                        | $F_{\text{interferer}}$ (offset) | MHz  | $-BW_{\text{Channel}}/2 - F_{\text{offset, case 1}}$<br>and<br>$BW_{\text{Channel}}/2 + F_{\text{offset, case 1}}$ | $\leq -BW_{\text{Channel}}/2 - F_{\text{offset, case 2}}$<br>and<br>$\geq BW_{\text{Channel}}/2 + F_{\text{offset, case 2}}$ |
|                                                                                                                                                                                                                                                                                                                                            | $F_{\text{interferer}}$          |      | NOTE 2                                                                                                             | $F_{\text{DL\_low}} - 3 \cdot BW_{\text{Channel}}$<br>to<br>$F_{\text{DL\_high}} + 3 \cdot BW_{\text{Channel}}$              |
| NOTE 1: The absolute value of the interferer offset $F_{\text{interferer}}$ (offset) shall be further adjusted to $(\lceil  F_{\text{interferer}}  / \text{SCS} \rceil + 0.5) \text{SCS}$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with an SCS equal to that of the wanted signal. |                                  |      |                                                                                                                    |                                                                                                                              |
| NOTE 2: For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: $-BW_{\text{Channel}}/2 - F_{\text{offset, case 1}}$ ; b: $BW_{\text{Channel}}/2 + F_{\text{offset, case 1}}$                                                                                                                       |                                  |      |                                                                                                                    |                                                                                                                              |
| NOTE 3: $BW_{\text{Channel}}$ denotes the channel bandwidth of the wanted signal                                                                                                                                                                                                                                                           |                                  |      |                                                                                                                    |                                                                                                                              |

### 7.6.3 Out-of-band blocking

For NR bands with  $F_{DL\_high} < 2700$  MHz and  $F_{UL\_high} < 2700$  MHz out-of-band band blocking is defined for an unwanted CW interfering signal falling outside a frequency range 15 MHz below or above the UE receive band. The throughput of the wanted signal shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.6.3-1 and Table 7.6.3-2. The relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal. For operating bands with an unpaired DL part (as noted in Table 5.2-1), the requirements only apply for carriers assigned in the paired part.

**Table 7.6.3-1: Out-of-band blocking parameters for NR bands with  $F_{DL\_high} < 2700$  MHz and  $F_{UL\_high} < 2700$  MHz**

| Channel bandwidth                                                                                                                                                             | Power in transmission bandwidth configuration [dBm] |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|
| 5 MHz                                                                                                                                                                         | REFSENS + 6.0 dB                                    |
| 10 MHz                                                                                                                                                                        | REFSENS + 6.0 dB                                    |
| 15 MHz                                                                                                                                                                        | REFSENS + 7.0 dB                                    |
| 20 MHz                                                                                                                                                                        | REFSENS + 9.0 dB                                    |
| 25 MHz                                                                                                                                                                        | REFSENS + 10.0 dB                                   |
| 30 MHz                                                                                                                                                                        | REFSENS + 11.0 dB                                   |
| 35 MHz                                                                                                                                                                        | REFSENS + 11.5 dB                                   |
| 40 MHz                                                                                                                                                                        | REFSENS + 12.0 dB                                   |
| 45 MHz                                                                                                                                                                        | REFSENS + 12.5 dB                                   |
| 50 MHz                                                                                                                                                                        | REFSENS + 13.0 dB                                   |
| 60 MHz                                                                                                                                                                        | REFSENS + 14.0 dB                                   |
| 70 MHz                                                                                                                                                                        | REFSENS + 14.5 dB                                   |
| 80 MHz                                                                                                                                                                        | REFSENS + 15.0 dB                                   |
| 90 MHz                                                                                                                                                                        | REFSENS + 15.5 dB                                   |
| 100 MHz                                                                                                                                                                       | REFSENS + 16.0 dB                                   |
| NOTE: The transmitter shall be set to 4 dB below $P_{CMAX\_L,f,c}$ at the minimum UL configuration specified in Table 7.3.2-3 with $P_{CMAX\_L,f,c}$ defined in clause 6.2.4. |                                                     |

**Table 7.6.3-2: Out of-band blocking for NR bands with  $F_{DL\_high} < 2700$  MHz and  $F_{UL\_high} < 2700$  MHz**

| NR band                                                                                                                                                                                                                             | Parameter             | Unit | Range 1                                                             | Range 2                                                                   | Range 3                                                                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|---------------------------------------------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                     | $P_{interferer}$      | dBm  | -44                                                                 | -30                                                                       | -15                                                                             |
| n1, n2, n3, n5, n7, n8, n12, n13, n14, n18, n20, n24, n25, n26, n28, n29, n30, n34, n38, n39, n40, n41, n48 <sup>5</sup> , n50, n51, n53 <sup>6</sup> , n65, n66, n67, n70, n71, n74, n75, n76, n85, n91, n92, n93, n94, n100, n101 | $F_{interferer}$ (CW) | MHz  | $-60 < f - F_{DL\_low} < -15$<br>or<br>$15 < f - F_{DL\_high} < 60$ | $-85 < f - F_{DL\_low} \leq -60$<br>or<br>$60 \leq f - F_{DL\_high} < 85$ | $1 \leq f \leq F_{DL\_low} - 85$<br>or<br>$F_{DL\_high} + 85 \leq f \leq 12750$ |
| NOTE 1: The power level of the interferer ( $P_{interferer}$ ) for Range 3 shall be modified to -20 dBm for $F_{interferer} > 6000$ MHz.                                                                                            |                       |      |                                                                     |                                                                           |                                                                                 |
| NOTE 2: For band 51 the $F_{DL\_high}$ of band 50 is applied as $F_{DL\_high}$ for band 51. For band 50, the $F_{DL\_low}$ of band 51 is applied as $F_{DL\_low}$ for band 50.                                                      |                       |      |                                                                     |                                                                           |                                                                                 |

- NOTE 3: For band 76 the  $F_{DL\_high}$  of band 75 is applied as  $F_{DL\_high}$  for band 76. For band 75, the  $F_{DL\_low}$  of band 76 is applied as  $F_{DL\_low}$  for band 75.
- NOTE 4: For UEs supporting both bands 38 and 41, the  $F_{DL\_high}$  and  $F_{DL\_low}$  of band 41 is applied as  $F_{DL\_high}$  and  $F_{DL\_low}$  for band 38.
- NOTE 5: n48 follows the requirement in this frequency range according to the general requirement defined in Clause 7.1. The power level of the interferer ( $P_{Interferer}$ ) for Range 3 shall be modified to -20 dBm for  $F_{Interferer} > 2700$  MHz and  $F_{Interferer} < 4800$  MHz.
- NOTE 6: The power level of the interferer ( $P_{Interferer}$ ) for Range 3 shall be modified to -20 dBm for  $F_{Interferer} \geq 2580$  MHz and  $F_{Interferer} < 2775$  MHz.
- NOTE 7: For UE supporting both bands 25 and 70, the  $F_{DL\_high}$  of band 70 is applied as  $F_{DL\_high}$  for band 25, and the  $F_{DL\_low}$  of band 25 is applied as  $F_{DL\_low}$  for band 70.
- NOTE 8: For bands 91 and 93 the  $F_{DL\_high}$  of bands 92 and 94 are applied as  $F_{DL\_high}$  for bands 91 and 93. For bands 92 and 94, the  $F_{DL\_low}$  of bands 91 and 93 are applied as  $F_{DL\_low}$  for bands 92 and 94.
- NOTE 9: For a UE supporting CA\_20A-28A and higher order band combinations in which CA\_20A-28A is a subset, the requirements for Band n20 and Band n28 apply with  $F_{DL\_low}$  given by the lower limit of the restricted operating frequency range in Band n28 and  $F_{DL\_high}$  by Band n20.
- NOTE 10: For SDL bands, requirements shall be applied only for CA band combination cases.

For interferer frequencies across ranges 1, 2 and 3 in Table 7.6.3-2, a maximum of

$$\lfloor \max \{24, 6 \cdot \lceil n \cdot N_{RB} / 6 \rceil \} / \min \{ \lfloor n \cdot N_{RB} / 10 \rfloor, 5 \} \rfloor$$

exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a step size of  $\min(BW_{Channel}/2, 5)$  MHz with  $N_{RB}$  the number of resource blocks in the downlink transmission bandwidth configuration,  $BW_{Channel}$  the bandwidth of the frequency channel in MHz and  $n = 1, 2, 3$  for SCS = 15, 30, 60 kHz, respectively. For these exceptions, the requirements in clause 7.7 apply.

For NR bands with  $F_{DL\_low} \geq 3300$  MHz and  $F_{UL\_low} \geq 3300$  MHz out-of-band band blocking is defined for an unwanted CW interfering signal falling outside a frequency range up to  $3 \cdot BW_{Channel}$  below or from  $3 \cdot BW_{Channel}$  above the UE receive band, where  $BW_{Channel}$  is the channel bandwidth. The throughput of the wanted signal shall be  $\geq 95$  % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.6.3-3 and Table 7.6.3-4. The relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal.

**Table 7.6.3-3: Out-of-band blocking parameters for NR bands with  $F_{DL\_low} \geq 3300$  MHz and  $F_{UL\_low} \geq 3300$  MHz**

| RX parameter                                                                                                                                                                  | Units | Channel bandwidth (MHz) |                |                                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------------|----------------|-------------------------------------------------|
|                                                                                                                                                                               |       | 10                      | 15             | 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100 |
| Power in transmission bandwidth configuration                                                                                                                                 | dBm   | REFSENS + 6 dB          | REFSENS + 7 dB | REFSENS + 9 dB                                  |
| NOTE: The transmitter shall be set to 4 dB below $P_{CMAX\_L,f,c}$ at the minimum UL configuration specified in Table 7.3.2-3 with $P_{CMAX\_L,f,c}$ defined in clause 6.2.4. |       |                         |                |                                                 |

**Table 7.6.3-4: Out of-band blocking for NR bands with  $F_{DL\_low} \geq 3300$  MHz and  $F_{UL\_low} \geq 3300$  MHz**

| NR band              | Parameter             | Unit | Range1                                                                                                        | Range 2                                                                                                                                 | Range 3                                                                                                                                                          |
|----------------------|-----------------------|------|---------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| n77, n78<br>(NOTE 3) | $P_{Interferer}$      | dBm  | -44                                                                                                           | -30                                                                                                                                     | -15                                                                                                                                                              |
|                      | $F_{Interferer}$ (CW) | MHz  | $-60 < f - F_{DL\_low} \leq -3 \cdot BW_{Channel}$<br>or<br>$3 \cdot BW_{Channel} \leq f - F_{DL\_high} < 60$ | $-200 < f - F_{DL\_low} \leq -$<br>$MAX(60, 3 \cdot BW_{Channel})$<br>or<br>$MAX(60, 3 \cdot BW_{Channel}) \leq f - F_{DL\_high} < 200$ | $1 \leq f \leq F_{DL\_low} -$<br>$MAX(200, 3 \cdot BW_{Channel})$<br>)<br>or<br>$F_{DL\_high} +$<br>$MAX(200, 3 \cdot BW_{Channel})$<br>)<br>$\leq f \leq 12750$ |
| n79<br>(NOTE 4)      | $F_{Interferer}$ (CW) | MHz  | N/A                                                                                                           | $-150 < f - F_{DL\_low} \leq -$<br>$MAX(60, 3 \cdot BW_{Channel})$                                                                      | $1 \leq f \leq F_{DL\_low} -$<br>$MAX(150, 3 \cdot BW_{Channel})$<br>)                                                                                           |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                              |     |     |                                                                                                                                         |                                                                                                                       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-----|-----|-----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                              |     |     | or<br>$\text{MAX}(60, 3 \cdot \text{BW}_{\text{Channel}}) \leq f - F_{\text{DL\_high}} < 150$                                           | or<br>$F_{\text{DL\_high}} + \text{MAX}(150, 3 \cdot \text{BW}_{\text{Channel}}) \leq f \leq 12750$                   |
| n104<br>(NOTE 5)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | $F_{\text{interferer}}$ (CW) | MHz | N/A | $-150 < f - F_{\text{DL\_low}} \leq -$<br>or<br>$\text{MAX}(60, 3 \cdot \text{BW}_{\text{Channel}}) \leq f - F_{\text{DL\_high}} < 150$ | $1 \leq f \leq F_{\text{DL\_low}} -$<br>or<br>$\text{MAX}(150, 3 \cdot \text{BW}_{\text{Channel}}) \leq f \leq 12750$ |
| <p>NOTE 1: The power level of the interferer (<math>P_{\text{interferer}}</math>) for Range 3 shall be modified to -20 dBm for <math>F_{\text{interferer}} &gt; 6000</math> MHz.</p> <p>NOTE 2: <math>\text{BW}_{\text{Channel}}</math> denotes the channel bandwidth of the wanted signal</p> <p>NOTE 3: The power level of the interferer (<math>P_{\text{interferer}}</math>) for Range 3 shall be modified to -20 dBm, for <math>F_{\text{interferer}} &gt; 2700</math> MHz and <math>F_{\text{interferer}} &lt; 4800</math> MHz. For <math>\text{BW}_{\text{Channel}} &gt; 15</math> MHz, the requirement for Range 1 is not applicable and Range 2 applies from the frequency offset of <math>3 \cdot \text{BW}_{\text{Channel}}</math> from the band edge. For <math>\text{BW}_{\text{Channel}}</math> larger than 60 MHz, the requirement for Range 2 is not applicable and Range 3 applies from the frequency offset of <math>3 \cdot \text{BW}_{\text{Channel}}</math> from the band edge.</p> <p>NOTE 4: The power level of the interferer (<math>P_{\text{interferer}}</math>) for Range 3 shall be modified to -20 dBm, for <math>F_{\text{interferer}} &gt; 3650</math> MHz and <math>F_{\text{interferer}} &lt; 5750</math> MHz. For <math>\text{BW}_{\text{Channel}} \geq 40</math> MHz, the requirement for Range 2 is not applicable and Range 3 applies from the frequency offset of <math>3 \cdot \text{BW}_{\text{Channel}}</math> from the band edge.</p> <p>NOTE 5: The power level of the interferer (<math>P_{\text{interferer}}</math>) for Range 3 shall be modified to -20 dBm, for <math>F_{\text{interferer}} &gt; 5175</math> MHz. For <math>\text{BW}_{\text{Channel}} &gt; 60</math> MHz, the requirement for Range 2 is not applicable and Range 3 applies from the frequency offset of <math>3 \cdot \text{BW}_{\text{Channel}}</math> from the band edge. The power level of the interferer (<math>P_{\text{interferer}}</math>) for Range 2 shall be modified to -33 dBm for the range <math>5925 - \text{MAX}(60, 3 \cdot \text{CBW}) \leq f &lt; F_{\text{DL\_low}} - \text{MAX}(60, 3 \cdot \text{CBW})</math>.</p> |                              |     |     |                                                                                                                                         |                                                                                                                       |

For interferer frequencies across ranges 1, 2 and 3 in Table 7.6.3-4, a maximum of

$$\lfloor \max \{24, 6 \cdot \lceil n \cdot N_{\text{RB}} / 6 \rceil \} / \min \{ \lfloor n \cdot N_{\text{RB}} / 10 \rfloor, 5 \} \rfloor$$

exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a step size of  $\min(\text{BW}_{\text{channel}}/2, 5)$  MHz with  $N_{\text{RB}}$  the number of resource blocks in the downlink transmission bandwidth configuration,  $\text{BW}_{\text{Channel}}$  the bandwidth of the frequency channel in MHz and  $n = 1, 2, 3$  for SCS = 15, 30, 60 kHz, respectively. For these exceptions, the requirements in clause 7.7 apply.

## 7.6.4 Narrow band blocking

This requirement is measure of a receiver's ability to receive a NR signal at its assigned channel frequency in the presence of an unwanted narrow band CW interferer at a frequency, which is less than the nominal channel spacing.

The relative throughput shall be  $\geq 95$  % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.6.4-1. For operating bands with an unpaired DL part (as noted in Table 5.2-1), the requirements only apply for carriers assigned in the paired part.

**Table 7.6.4-1: Narrow Band Blocking**

| NR band                                 | Parameter            | Unit | Channel Bandwidth (MHz)                                              |    |    |    |                        |                     |  |
|-----------------------------------------|----------------------|------|----------------------------------------------------------------------|----|----|----|------------------------|---------------------|--|
|                                         |                      |      | 5                                                                    | 10 | 15 | 20 | 25, 30, 35, 40, 45, 50 | 60, 70, 80, 90, 100 |  |
| n1, n2, n3,<br>n5, n7, n8,<br>n12, n13, | $P_w$                | dBm  | $P_{\text{REFSENS}} + \text{channel-bandwidth specific value below}$ |    |    |    |                        |                     |  |
|                                         |                      | dB   | 16                                                                   | 13 | 14 | 16 | 16                     | 16                  |  |
|                                         | $P_{\text{UW}}$ (CW) | dBm  | -55                                                                  |    |    |    |                        |                     |  |

|                                                                                                                                                                                             |                                                  |     |                                                                                              |                                                                                                                |                                                                                                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|-----|----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| n14, n18,<br>n20, n24,<br>n25, n26,<br>n28, n29,<br>n30, n34,<br>n38, n39,<br>n40, n41,<br>n48, n50,<br>n51, n53,<br>n65, n66,<br>n67, n70,<br>n71, n74,<br>n75, n76,<br>n85, n100,<br>n101 | $F_{uw}$ (offset<br>SCS= 15<br>kHz) <sup>4</sup> | MHz | $\left( \left\lceil \frac{\frac{BW_{channel}}{2} + 0.2}{SCS} \right\rceil + 0.5 \right) SCS$ | $\left( \left\lceil \frac{\frac{BW_{channel}}{2} + BW_{GB,channel}}{SCS} + 0.5 \right\rceil + 0.5 \right) SCS$ | NA                                                                                                       |
|                                                                                                                                                                                             | $F_{uw}$ (offset<br>SCS= 30<br>kHz) <sup>4</sup> | MHz | NA                                                                                           |                                                                                                                | $\left( \left\lceil \frac{\frac{BW_{channel}}{2} + BW_{GB,channel}}{SCS} \right\rceil + 0.5 \right) SCS$ |

NOTE 1: The transmitter shall be set a 4 dB below  $P_{CMAX\_L,f,c}$  at the minimum UL configuration specified in Table 7.3.2-3 with  $P_{CMAX\_L,f,c}$  defined in clause 6.2.4

NOTE 2: Reference measurement channel is specified in Annexes A.3.2 and A.3.3 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.

NOTE 3: The  $P_{REFSENS}$  power level is specified in Table 7.3.2-1a, Table 7.3.2-1b and Table 7.3.2-2 for two and four antenna ports, respectively.

NOTE 4:  $F_{uw}$  shall be rounded to half of SCS.

NOTE 5: For SDL bands, requirements shall be applied only for CA band combination cases.

## 7.6A Blocking characteristics for CA

### 7.6A.1 General

### 7.6A.2 In-band blocking for CA

#### 7.6A.2.1 In-band blocking for Intra-band contiguous CA

For intra-band contiguous carrier aggregation the downlink SCC(s) shall be configured at nominal channel spacing to the PCC. The UE shall fulfil the minimum requirement specified in Table 7.6A.2.1-1 and 7.6A.2.1-1a for an adjacent channel interferer on either side of the aggregated downlink signal at a specified frequency offset and for an interferer power up to -25 dBm. The throughput of each carrier shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).

**Table 7.6A.2.1-1: In-band blocking parameters for intra-band contiguous CA with  $F_{DL\_low} \geq 3300$  MHz and  $F_{UL\_low} \geq 3300$  MHz**

| Rx Parameter                                       | Units | NR CA bandwidth class                             |                                         |      |  |
|----------------------------------------------------|-------|---------------------------------------------------|-----------------------------------------|------|--|
|                                                    |       | B                                                 | C                                       | D    |  |
| Pw in Transmission Bandwidth Configuration, per CC | dBm   | REFSENS + CA bandwidth class specific value below |                                         |      |  |
|                                                    | dB    | 10.0                                              | 6                                       | 13.8 |  |
| $BW_{interferer}$                                  | MHz   | 20                                                | $BW_{channel\ CA}$                      | 50   |  |
| $F_{offset, case\ 1}$                              | MHz   | 30                                                | $BW_{channel\ CA} + BW_{channel\ CA}/2$ | 75   |  |
| $F_{offset, case\ 2}$                              | MHz   | 50                                                | $BW_{interferer} + F_{offset, case\ 1}$ | 125  |  |

NOTE 1: The transmitter shall be set to 4dB below  $P_{CMAX\_L,f,c}$  at the minimum UL configuration specified in Table 7.3.2-3 with  $P_{CMAX\_L,f,c}$  defined in clause 6.2.4.

NOTE 2: The interferer consists of the Reference measurement channel specified in Annexes A.3.2 and A.3.3 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1

**Table 7.6A.2.1-1a: In-band blocking parameters for intra-band contiguous CA with  $F_{DL\_low} < 2700$  MHz and  $F_{UL\_low} < 2700$  MHz**

| Rx Parameter | Units | NR CA bandwidth class |
|--------------|-------|-----------------------|
|--------------|-------|-----------------------|

|                                                                                                                                                                                                                                      |     | <b>B</b>                                             | <b>C</b> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------------------------------------------------------|----------|
| Pw in Transmission Bandwidth Configuration, per CC                                                                                                                                                                                   | dBm | REFSENS + NR CA bandwidth class specific value below |          |
|                                                                                                                                                                                                                                      | dB  | 16.0                                                 | 19.0     |
| BW <sub>interferer</sub>                                                                                                                                                                                                             | MHz | 5                                                    | 5        |
| F <sub>offset</sub> , case 1                                                                                                                                                                                                         | MHz | 7.5                                                  | 7.5      |
| F <sub>offset</sub> , case 2                                                                                                                                                                                                         | MHz | 12.5                                                 | 12.5     |
| NOTE 1: The transmitter shall be set to 4 dB below P <sub>C<sub>MAX</sub>,L,f,c</sub> at the minimum UL configuration specified in Table 7.3.2-3 with P <sub>C<sub>MAX</sub>,L,f,c</sub> defined in clause 6.2.4.                    |     |                                                      |          |
| NOTE 2: The interferer consists of the Reference measurement channel specified in Annexes A.3.2 and A.3.3 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1 |     |                                                      |          |

**Table 7.6A.2.1-2: In-band blocking for intra-band contiguous CA with F<sub>DL\_low</sub> ≥ 3300 MHz and F<sub>UL\_low</sub> ≥ 3300 MHz**

| NR band                                                                                                                                                                                                                                                                                                                                                          | Parameter                        | Unit | Case 1                                                                                                           | Case 2                                                                                                               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|------|------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                                                                  | P <sub>interferer</sub>          | dBm  | -56                                                                                                              | -44                                                                                                                  |
| n77, n78, n79                                                                                                                                                                                                                                                                                                                                                    | F <sub>interferer</sub> (offset) | MHz  | -F <sub>offset</sub> - F <sub>offset</sub> , case 1<br>and<br>F <sub>offset</sub> + F <sub>offset</sub> , case 1 | ≤ -F <sub>offset</sub> - F <sub>offset</sub> , case 2<br>and<br>≥ F <sub>offset</sub> + F <sub>offset</sub> , case 2 |
|                                                                                                                                                                                                                                                                                                                                                                  | F <sub>interferer</sub>          | MHz  | NOTE 2                                                                                                           | F <sub>DL_low</sub> - 3BW <sub>channel CA</sub><br>to<br>F <sub>DL_high</sub> + 3BW <sub>channel CA</sub>            |
| NOTE 1: The absolute value of the interferer offset F <sub>interferer</sub> (offset) shall be further adjusted to $(\lceil  F_{\text{interferer}}  / \text{SCS} \rceil + 0.5) \text{SCS}$ MHz with SCS the sub-carrier spacing of the carrier closest to the interferer in MHz. The interferer is an NR signal with an SCS equal to that of the closest carrier. |                                  |      |                                                                                                                  |                                                                                                                      |
| NOTE 2: For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -F <sub>offset</sub> - F <sub>offset</sub> , case 1; b: F <sub>offset</sub> + F <sub>offset</sub> , case 1                                                                                                                                                |                                  |      |                                                                                                                  |                                                                                                                      |
| NOTE 3: BW <sub>channel CA</sub> denotes the aggregated channel bandwidth of the wanted signal                                                                                                                                                                                                                                                                   |                                  |      |                                                                                                                  |                                                                                                                      |

**Table 7.6A.2.1-2a: In-band blocking for intra-band contiguous CA with F<sub>DL\_low</sub> < 2700 MHz and F<sub>UL\_low</sub> < 2700 MHz**

| NR band                                                                                                                                                                                                                                                                                                                         | Parameter                        | Unit | Case 1                                                                                                           | Case 2                                                                                                               | Case 3                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|------|------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------|
|                                                                                                                                                                                                                                                                                                                                 | P <sub>interferer</sub>          | dBm  | -56                                                                                                              | -44                                                                                                                  |                          |
| n2, n3, n25, n38, n41, n66, n48 <sup>4</sup> , n40                                                                                                                                                                                                                                                                              | F <sub>interferer</sub> (offset) | MHz  | -F <sub>offset</sub> - F <sub>offset</sub> , case 1<br>and<br>F <sub>offset</sub> + F <sub>offset</sub> , case 1 | ≤ -F <sub>offset</sub> - F <sub>offset</sub> , case 2<br>and<br>≥ F <sub>offset</sub> + F <sub>offset</sub> , case 2 |                          |
|                                                                                                                                                                                                                                                                                                                                 | F <sub>interferer</sub>          | MHz  | NOTE 2                                                                                                           | F <sub>DL_low</sub> - 15<br>to<br>F <sub>DL_high</sub> + 15                                                          |                          |
| n71                                                                                                                                                                                                                                                                                                                             | F <sub>interferer</sub>          | MHz  | NOTE 2                                                                                                           | F <sub>DL_low</sub> - 12<br>to<br>F <sub>DL_high</sub> + 15                                                          | F <sub>DL_low</sub> - 12 |
| NOTE 1: The absolute value of the interferer offset F <sub>interferer</sub> (offset) shall be further adjusted to $(\lceil  F_{\text{interferer}}  / \text{SCS} \rceil + 0.5) \text{SCS}$ MHz with SCS the sub-carrier spacing of the carrier closest to the interferer in MHz. The interferer is an NR signal with 15 kHz SCS. |                                  |      |                                                                                                                  |                                                                                                                      |                          |
| NOTE 2: For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: -F <sub>offset</sub> - F <sub>offset</sub> , case 1; b: F <sub>offset</sub> + F <sub>offset</sub> , case 1                                                                                                               |                                  |      |                                                                                                                  |                                                                                                                      |                          |
| NOTE 3: BW <sub>channel CA</sub> denotes the aggregated channel bandwidth of the wanted signal                                                                                                                                                                                                                                  |                                  |      |                                                                                                                  |                                                                                                                      |                          |
| NOTE 4: n48 follows the requirement in this frequency range according to the general requirement defined in Clause 7.1A.                                                                                                                                                                                                        |                                  |      |                                                                                                                  |                                                                                                                      |                          |

## 7.6A.2.2 In-band blocking for Intra-band non-contiguous CA

For intra-band non-contiguous carrier aggregation with one uplink carrier and two or more downlink sub-blocks, each larger than or equal to 5 MHz, the in-band blocking requirements are defined with the uplink configuration in accordance with Table 7.3A.2.2-1. For this uplink configuration, the UE shall meet the requirements for each sub-block

as specified in clause 7.6.2 and 7.6A.2.1 for one component carrier and two component carriers per sub-block, respectively. The requirements apply for in-gap and out-of-gap interferers while all downlink carriers are active.

The throughput of each carrier shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).

### 7.6A.2.3 In-band blocking for Inter-band CA

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one NR band, the in-band blocking requirements are defined with the uplink active on the band(s) other than the band whose downlink is being tested. The UE shall meet the requirements specified in clause 7.6.2 and clause 7.6F.2 when the downlink belongs to a spectrum sharing defined band, for each component carrier while all downlink carriers are active.

For the UE which supports inter-band CA configuration in Table 7.3A.3.2.1-1,  $P_{\text{interferer}}$  power defined in Table 7.6.2-2 and 7.6.2-4, and Table 7.6F.2.1-2 for shared spectrum channel access, is increased by the amount given by  $\Delta R_{\text{IB,c}}$  in Table 7.3A.3.2.1-1 and in Table 7.3F.3-1 for shared spectrum channel access.

For NR CA configurations including an operating band without uplink operation or an operating band with an unpaired DL part (as noted in Table 5.2-1), the requirements for all downlinks shall be met with the single uplink carrier active in each band capable of UL operation. The requirements for the component carrier configured in the operating band without uplink operation are specified in clause 7.6.2 while all downlink carriers are active.

**Table 7.6A.2.3-1: Void**

The throughput of each carrier shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).

### 7.6A.3 Out-of-band blocking for CA

#### 7.6A.3.1 Out-of-band blocking for Intra-band contiguous CA

For intra-band contiguous carrier aggregation the downlink SCC(s) shall be configured at nominal channel spacing to the PCC. For FDD, the PCC shall be configured closest to the uplink band. All downlink carriers shall be active throughout the test.

The UE shall fulfil the minimum requirement in presence of an interfering signal specified in Table 7.6A.3-1 and Table 7.6A.3-2 being on either side of the aggregated signal. The throughput of each carrier shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).

**Table 7.6A.3-1: Out-of-band blocking parameters for intra-band contiguous CA**

| RX parameter                                                                                                                                                                                  | Units | CA bandwidth class                                |   |   |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------------------------------------------------|---|---|--|
|                                                                                                                                                                                               |       | B                                                 | C | D |  |
| Power in transmission bandwidth configuration                                                                                                                                                 | dBm   | REFSENS + CA bandwidth class specific value below |   |   |  |
|                                                                                                                                                                                               | dB    | 9                                                 | 9 | 9 |  |
| NOTE 1: The transmitter shall be set to 4 dB below $P_{\text{CMAX\_L,f,c}}$ at the minimum UL configuration specified in Table 7.3.2-3 with $P_{\text{CMAX\_L,f,c}}$ defined in clause 6.2.4. |       |                                                   |   |   |  |

**Table 7.6A.3-1a: Void**



**Table 7.6A.3-2: Out of-band blocking for intra-band contiguous CA**

| NR band                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Parameter                    | Unit | Range1                                                                            | Range 2                                                                                 | Range 3                                                                                                                                                                                                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | $P_{\text{Interferer}}$      | dBm  | -45                                                                               | -30                                                                                     | -15                                                                                                                                                                                                     |
| n2, n3,<br>n25, n38,<br>n41, n66,<br>n71, n48 <sup>5</sup> ,<br>n40                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | $F_{\text{Interferer}}$ (CW) | MHz  | $-60 < f - F_{\text{DL\_low}} < -15$<br>or<br>$15 < f - F_{\text{DL\_high}} < 60$ | $-85 < f - F_{\text{DL\_low}} \leq -60$<br>or<br>$60 \leq f - F_{\text{DL\_high}} < 85$ | $1 \leq f \leq F_{\text{DL\_low}} - 85$<br>or<br>$F_{\text{DL\_high}} + 85 \leq f \leq 12750$                                                                                                           |
| n77, n78<br>(NOTE 3)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | $F_{\text{Interferer}}$ (CW) | MHz  | N/A                                                                               | N/A                                                                                     | $1 \leq f \leq F_{\text{DL\_low}} - \text{MAX}(200, 3 \cdot \text{BW}_{\text{Channel\_CA}})$<br>or<br>$F_{\text{DL\_high}} + \text{MAX}(200, 3 \cdot \text{BW}_{\text{Channel\_CA}}) \leq f \leq 12750$ |
| n79<br>(NOTE 4)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | $F_{\text{Interferer}}$ (CW) | MHz  | N/A                                                                               | N/A                                                                                     | $1 \leq f \leq F_{\text{DL\_low}} - \text{MAX}(150, 3 \cdot \text{BW}_{\text{Channel\_CA}})$<br>or<br>$F_{\text{DL\_high}} + \text{MAX}(150, 3 \cdot \text{BW}_{\text{Channel\_CA}}) \leq f \leq 12750$ |
| <p>NOTE 1: The power level of the interferer (<math>P_{\text{Interferer}}</math>) for Range 3 shall be modified to -20 dBm for <math>F_{\text{Interferer}} &gt; 6000</math> MHz.</p> <p>NOTE 2: <math>\text{BW}_{\text{Channel\_CA}}</math> denotes the aggregated channel bandwidth of the wanted signal</p> <p>NOTE 3: The power level of the interferer (<math>P_{\text{Interferer}}</math>) for Range 3 shall be modified to -20 dBm, for <math>F_{\text{Interferer}} &gt; 2700</math> MHz and <math>F_{\text{Interferer}} &lt; 4800</math> MHz. For <math>\text{BW}_{\text{Channel\_CA}} &gt; 15</math> MHz, the requirement for Range 1 is not applicable and Range 2 applies from the frequency offset of <math>3 \cdot \text{BW}_{\text{Channel\_CA}}</math> from the band edge. For <math>\text{BW}_{\text{Channel\_CA}} &gt; 65</math> MHz, the requirement for Range 2 is not applicable and Range 3 applies from the frequency offset of <math>3 \cdot \text{BW}_{\text{Channel\_CA}}</math> from the band edge.</p> <p>NOTE 4: The power level of the interferer (<math>P_{\text{Interferer}}</math>) for Range 3 shall be modified to -20 dBm, for <math>F_{\text{Interferer}} &gt; 3650</math> MHz and <math>F_{\text{Interferer}} &lt; 5750</math> MHz. For <math>\text{BW}_{\text{Channel\_CA}} &gt; 45</math> MHz, the requirement for Range 2 is not applicable and Range 3 applies from the frequency offset of <math>3 \cdot \text{BW}_{\text{Channel\_CA}}</math> from the band edge.</p> <p>NOTE 5: The power level of the interferer (<math>P_{\text{Interferer}}</math>) for Range 3 shall be modified to -20 dBm for <math>F_{\text{Interferer}} &gt; 2700</math> MHz and <math>F_{\text{Interferer}} &lt; 4800</math> MHz</p> |                              |      |                                                                                   |                                                                                         |                                                                                                                                                                                                         |

**Table 7.6A.3-2a: Void**

For interferer frequencies across ranges 1, 2 and 3 in Table 7.6A.3-2, a maximum of

$$\lfloor \max \{24, 6 \cdot \lceil n \cdot N_{\text{RB}} / 6 \rceil \} / \min \{ \lfloor n \cdot N_{\text{RB}} / 10 \rfloor, 5 \} \rfloor$$

exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a step size of  $\min(\text{BW}_{\text{channel}}/2, 5)$  MHz with  $N_{\text{RB}}$  the number of resource blocks in the downlink transmission bandwidth configuration,  $\text{BW}_{\text{channel}}$  is the bandwidth of the frequency channel in MHz and  $n = 1, 2, 3$  for SCS = 15, 30, 60 kHz, respectively. For these exceptions, the requirements in subclause 7.7A.1 apply.

### 7.6A.3.2 Out-of-band blocking for Intra-band non-contiguous CA

For intra-band non-contiguous carrier aggregation with one uplink carrier and two or more downlink sub-blocks, the out-of-band blocking requirements are defined with the uplink configuration in accordance with table 7.3A.2.2-1. For this uplink configuration, the UE shall meet the requirements for each sub-block as specified in clauses 7.6.3 and 7.6A.3.1 for one component carrier and two component carriers per sub-block, respectively. The requirements apply with all downlink carriers active.

The throughput of each carrier shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).

### 7.6A.3.3 Out-of-band blocking for Inter-band CA

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one NR band, the out-of-band blocking requirements are defined with the uplink active on the band(s) other than the band whose downlink is being tested. For NR CA configurations including an operating band without uplink band or an operating band with an unpaired DL part (as noted in Table 5.2-1), the requirements for all downlinks shall be met with

the single uplink carrier active in each band capable of UL operation. The UE shall meet the requirements specified in clause 7.6.3 for each component carrier while all downlink carriers are active.

For inter-band carrier aggregation with component carriers in operating bands < 2.7GHz including n48, and for  $F_{DL\_Low(j)} - 15 \text{ MHz} \leq f \leq F_{DL\_High(j)} + 15 \text{ MHz}$ , the appropriate adjacent channel selectivity and in-band blocking requirements in the respective clauses 7.5 and 7.6.2 shall be applied for carrier  $j$ . For inter-band carrier aggregation with component carriers in operating bands > 2.7GHz excluding n48, and for  $F_{DL\_Low(j)} - 3 * BW_{channel} \leq f \leq F_{DL\_High(j)} + 3 * BW_{channel}$ , the appropriate adjacent channel selectivity and in-band blocking requirements in the respective clauses 7.5 and 7.6.2 shall be applied for carrier  $j$ .  $F_{DL\_Low(j)}$  and  $F_{DL\_High(j)}$  denote the respective lower and upper frequency limits of the operating band containing carrier  $j$ ,  $j = 1, \dots, X$ , with carriers numbered in increasing order of carrier frequency and  $X$  the number of component carriers in the band combination.  $BW_{channel}$  denotes the channel bandwidth of the wanted signal component carrier  $j$ . If CW interferer falls in a gap between  $F_{DL\_High(j)}$  and  $F_{DL\_Low(j+1)}$  where the corresponding OOB ranges 1 and 2 overlap, then the lower level interferer limit of the overlapping OOB ranges applies.

If  $F_{DL\_high}$  of the lower NR band is greater than or equal to the  $F_{DL\_low}$  of the another upper NR band as in overlapping RX frequency ranges, then the OOB range shall start from the  $F_{DL\_low}$  of the lower NR band, and from the  $F_{DL\_high}$  of the upper NR band.

For inter-band carrier aggregation with uplink assigned to two NR bands, the out-of-band blocking requirements specified in clause 7.6.3 shall be met with the transmitter power for the uplink set to 7 dB below  $P_{CMAX\_L,f,c}$  for each serving cell  $c$ .

For the UE which supports inter-band CA configuration in Table 7.3A.3.2.1-1,  $P_{interferer}$  power defined in Table 7.6.3-2 and 7.6.3-4 and Table 7.6F.3.2-2 for shared spectrum channel access, is increased by the amount given by  $\Delta R_{IB,c}$  in Table 7.3A.3.2.1-1 and in Table 7.3F.3-1 for shared spectrum channel access.

For inter-band CA combination listed in Table 7.6A.3.3-1, exceptions to the requirement specified in Table 7.6A.3.3-2 are allowed when the second order intermodulation product of the lower frequency band UL carrier and the CW interfering signal fully or partially overlaps with the higher frequency band DL carrier. Unless otherwise stated, the exceptions apply to any power classes for the listed inter-band CA combinations.

**Table 7.6A.3.3-1: CA band combination with exceptions allowed**

| CA band combination |
|---------------------|
| CA_n5-n77           |
| CA_n5-n78           |
| CA_n5-n79           |
| CA_n7-n8            |
| CA_n7-n46           |
| CA_n8-n77           |
| CA_n8-n78           |
| CA_n8-n79           |
| CA_n12-n48          |
| CA_n12-n77          |
| CA_n13-n77          |
| CA_n14-n77          |
| CA_n18-n77          |
| CA_n18-n78          |
| CA_n20-n78          |
| CA_n28-n46          |
| CA_n28-n77          |
| CA_n28-n78          |
| CA_n28-n79          |
| CA_n48-n71          |
| CA_n48-n77          |
| CA_n71-n77          |
| CA_n71-n78          |
| CA_n78-n92          |

Table 7.6A.3.3-1a: Void

Table 7.6A.3.3-2: Requirement for out-of-band blocking exceptions

| Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Unit | Level            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------------------|
| $P_{\text{Interferer}}(\text{CW})$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | dBm  | -44 <sup>1</sup> |
| NOTE 1: The requirement applies when $ f_{\text{Interferer}} \pm f_{\text{UL}}^{\text{LB}} - f_{\text{DL}}^{\text{HB}}  \leq (BW_{\text{UL}}^{\text{LB}} + BW_{\text{DL}}^{\text{HB}})/2$ , where $f_{\text{UL}}^{\text{LB}}$ and $f_{\text{DL}}^{\text{HB}}$ are the carrier frequencies for lower frequency band UL and higher frequency band DL, respectively. $BW_{\text{UL}}^{\text{LB}}$ and $BW_{\text{DL}}^{\text{HB}}$ are the channel bandwidths configured for lower frequency band UL carrier and higher frequency band DL carrier in MHz, respectively. |      |                  |

For all interferer frequency ranges specified in clause 7.6.3 a maximum of

$$\lfloor \max \{24, 6 \cdot \lceil n \cdot N_{\text{RB}} / 6 \rceil \} / \min \{ \lfloor n \cdot N_{\text{RB}} / 10 \rfloor, 5 \} \rfloor$$

exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a step size of  $\min(BW_{\text{channel}}/2, 5)$  MHz with  $N_{\text{RB}}$  the number of resource blocks in the downlink transmission bandwidth configuration,  $BW_{\text{channel}}$  the bandwidth of the frequency channel in MHz and  $n = 1, 2, 3$  for SCS = 15, 30, 60 kHz, respectively. For these exceptions, the requirements in clause 7.7 apply.

The throughput of each carrier shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).

## 7.6A.4 Narrow band blocking for CA

### 7.6A.4.1 Narrow band blocking for Intra-band contiguous CA

For intra-band contiguous carrier aggregation, the downlink SCC(s) shall be configured at nominal channel spacing to the PCC. For FDD, the PCC shall be configured closest to the uplink band. All downlink carriers shall be active throughout the test. The uplink output power shall be set as specified in Table 7.6A.4.1-1 with the uplink configuration. For UE(s) supporting one uplink, the uplink configuration of the PCC shall be in accordance with Table 7.3.2-3. The UE shall fulfil the minimum requirement in presence of an interfering signal specified in Table 7.6A.4.1-1 being on either side of the aggregated signal. The throughput of each carrier shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.6A.4.1-1.

Table 7.6A.4.1-1: Narrow-band blocking for intra-band contiguous CA

| NR band                                       | Parameter                                                      | Unit | NR CA bandwidth class                                           |                                                                 |
|-----------------------------------------------|----------------------------------------------------------------|------|-----------------------------------------------------------------|-----------------------------------------------------------------|
|                                               |                                                                |      | B                                                               | C                                                               |
| n1, n2, n3, n25, n38, n41, n66, n71, n48, n40 | $P_{\text{w}}$ in Transmission Bandwidth Configuration, per CC | dBm  | REFSENS + NR CA Bandwidth Class specific value below            |                                                                 |
|                                               |                                                                | dB   | 16                                                              | 16                                                              |
|                                               | $P_{\text{uw}}$ (CW)                                           | dBm  | -55                                                             | -55                                                             |
|                                               | $F_{\text{uw}}$ (offset for $\Delta f = 15$ kHz, 30 kHz)       | MHz  | - $F_{\text{offset}} - 0.2$<br>/<br>+ $F_{\text{offset}} + 0.2$ | - $F_{\text{offset}} - 0.2$<br>/<br>+ $F_{\text{offset}} + 0.2$ |
|                                               |                                                                |      |                                                                 |                                                                 |

- NOTE 1: The transmitter shall be set a 4 dB below  $P_{\text{CMAX\_L,f,c}}$  at the minimum UL configuration specified in Table 7.3.2-3 with  $P_{\text{CMAX\_L,f,c}}$  defined in clause 6.2.4.
- NOTE 2: Reference measurement channel is specified in Annexes A.3.2 and A3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.
- NOTE 3: The PREFSENS power level is specified in Table 7.3.2-1a, Table 7.3.2-1b and Table 7.3.2-2 for two and four antenna ports, respectively.
- NOTE 4: The  $F_{\text{uw}}$  (offset) is the frequency separation of the center frequency of the carrier closest to the interferer and the center frequency of the interferer and shall be further adjusted to  $\lfloor F_{\text{interferer}} / \text{SCS} + 0.5 \rfloor \text{SCS} + 0.5 \text{SCS MHz}$  to be offset from the sub-carrier raster.

#### 7.6A.4.2 Narrow band blocking for Intra-band non-contiguous CA

For intra-band non-contiguous carrier aggregation with  $F_{\text{DL\_low}} < 2700$  MHz and  $F_{\text{UL\_low}} < 2700$  MHz with one uplink carrier and two or more downlink sub-blocks, the narrow band blocking requirements are defined with the uplink configuration in accordance with Table 7.3A.2.2-1. For this uplink configuration, the UE shall meet the requirements for each sub-block as specified in clauses 7.6.4 and 7.6A.4.1 for one component carrier and two component carriers per sub-block, respectively. The requirements apply for in-gap and out-of-gap interferers while all downlink carriers are active.

The throughput of each carrier shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).

#### 7.6A.4.3 Narrow band blocking for Inter-band CA

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one NR band, the narrow band blocking requirements are defined with the uplink active on the band(s) other than the band whose downlink is being tested. For NR CA configurations including an operating band without uplink band or an operating band with an unpaired DL part (as noted in Table 5.2-1), the requirements for all downlinks shall be met with the single uplink carrier active in each band capable of UL operation. The UE shall meet the requirements specified in clause 7.6.4 for each component carrier while all downlink carriers are active.

For the UE which supports inter-band CA configuration in Table 7.3A.3.2.1-1,  $P_{\text{UW}}$  power defined in Table 7.6.4-1 is increased by the amount given by  $\Delta R_{\text{IB,c}}$  in Table 7.3A.3.2.1-1.

The throughput of each carrier shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).

### 7.6B Blocking characteristics for NR-DC

For inter-band NR-DC configurations, the blocking characteristics for the corresponding inter-band CA configuration as specified in clause 7.6A applies.

### 7.6C Blocking characteristics for SUL

#### 7.6C.1 General

#### 7.6C.2 In-band blocking for SUL

For SUL operation, the in-band blocking requirement for downlink bands specified in clause 7.6.2 shall be met.

For SUL operation with downlink CA, the in-band blocking requirement for downlink bands specified in clause 7.6A.2 shall be met.

### 7.6C.3 Out-of-band blocking for SUL

For SUL operation, the out-of-band blocking requirement for downlink bands specified in clause 7.6.3 shall be met. For SUL operation with downlink CA, the out-of-band blocking requirement for downlink bands specified in clause 7.6A.3 shall be met. For operation band combination listed in Table 7.6C.3-1, exceptions to the requirement specified in Table 7.6C.3-2 are allowed when the second order intermodulation product of the SUL carrier and the CW interfering signal fully or partially overlaps with the DL carrier.

**Table 7.6C.3-1: SUL operating band combination with exceptions allowed**

| NR Band combination for SUL |
|-----------------------------|
| SUL_n78-n81                 |
| SUL_n78-n82                 |
| SUL_n78-n83                 |
| SUL_n79-n81                 |
| SUL_n79-n83                 |

**Table 7.6C.3-2: Requirement for out-of-band blocking exceptions**

| Parameter                                                                                                                                                                                                                                                                            | Unit | Level            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------------------|
| $P_{\text{Interferer}} \text{ (CW)}$                                                                                                                                                                                                                                                 | dBm  | -44 <sup>1</sup> |
| NOTE 1: The requirement applies when $ f_{\text{Interferer}} \pm f_{\text{SUL}} - f_{\text{DL}}  \leq (BW_{\text{SUL}} + BW_{\text{DL}})/2$ , where $BW_{\text{SUL}}$ and $BW_{\text{DL}}$ are the channel bandwidths configured for SUL and DL (victim) bands in MHz, respectively. |      |                  |

For all interferer frequency ranges specified in clause 7.6.3 a maximum of

$$\lfloor \max \{24, 6 \cdot \lceil n \cdot N_{\text{RB}} / 6 \rceil \} / \min \{ \lfloor n \cdot N_{\text{RB}} / 10 \rfloor, 5 \} \rfloor$$

exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a step size of  $\min(BW_{\text{channel}}/2, 5)$  MHz with  $N_{\text{RB}}$  the number of resource blocks in the downlink transmission bandwidth configuration,  $BW_{\text{Channel}}$  the bandwidth of the frequency channel in MHz and  $n = 1, 2, 3$  for SCS = 15, 30, 60 kHz, respectively. For these exceptions, the requirements in clause 7.7 apply.

### 7.6C.4 Narrow band blocking for SUL

Narrow band blocking is not specified for SUL band combination.

## 7.6D Blocking characteristics for UL MIMO

For UE with two transmitter antenna connectors in closed-loop spatial multiplexing scheme, the minimum requirements specified in clause 7.6 shall be met with the UL MIMO configurations described in clause 6.2D.1 and in clause 6.2F.1D for shared spectrum access operation. For UL MIMO, the parameter  $P_{\text{C}_{\text{MAX\_L}}}$  is defined as the total transmitter power over the two transmit antenna connectors.

## 7.6E Blocking characteristics for V2X

### 7.6E.1 General

The blocking characteristic is a measure of the receiver's ability to receive a wanted signal at its assigned channel frequency in the presence of an unwanted interferer on frequencies other than those of the spurious response or the adjacent channels, without this unwanted input signal causing a degradation of the performance of the receiver beyond a specified limit. The blocking performance shall apply at all frequencies except those at which a spurious response occurs.

## 7.6E.2 In-band blocking

### 7.6E.2.1 General

When UE is configured for NR V2X reception non-concurrent with NR uplink transmissions for NR V2X operating bands specified in Table 5.2E.1-1, the throughput of the wanted signal shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annex A.7.2 with parameters specified in Table 7.6E.2.1-1 and Table 7.6E.2.1-2. The relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal.

**Table 7.6E.2.1-1: In-band blocking parameters for NR V2X**

| RX parameter                                                                                                        | Units | Channel bandwidth                                                  |        |        |        |
|---------------------------------------------------------------------------------------------------------------------|-------|--------------------------------------------------------------------|--------|--------|--------|
|                                                                                                                     |       | 10 MHz                                                             | 20 MHz | 30 MHz | 40 MHz |
| Power in transmission bandwidth configuration                                                                       | dBm   | P <sub>PREFSENS_V2X</sub> + channel bandwidth specific value below |        |        |        |
|                                                                                                                     | dB    | 6                                                                  | 9      | 11     | 12     |
| BW <sub>interferer</sub>                                                                                            | MHz   | 10                                                                 |        |        |        |
| F <sub>offset, case 1</sub>                                                                                         | MHz   | 15                                                                 |        |        |        |
| F <sub>offset, case 2</sub>                                                                                         | MHz   | 25                                                                 |        |        |        |
| NOTE 1: The interferer is QPSK modulated PUSCH containing data and reference symbols. Normal cyclic prefix is used. |       |                                                                    |        |        |        |

**Table 7.6E.2.1-1a: In-band blocking parameters in n14**

| RX parameter                                                                                                        | Units | Channel bandwidth                                     |        |        |        |        |
|---------------------------------------------------------------------------------------------------------------------|-------|-------------------------------------------------------|--------|--------|--------|--------|
|                                                                                                                     |       | 5 MHz                                                 | 10 MHz | 20 MHz | 30 MHz | 40 MHz |
| Power in transmission bandwidth configuration                                                                       | dBm   | PREFSENS_V2X + channel bandwidth specific value below |        |        |        |        |
|                                                                                                                     | dB    | 6                                                     | 6      |        |        |        |
| BW <sub>interferer</sub>                                                                                            | MHz   | 5                                                     |        |        |        |        |
| F <sub>offset, case 1</sub>                                                                                         | MHz   | 7.5                                                   |        |        |        |        |
| F <sub>offset, case 2</sub>                                                                                         | MHz   | 12.5                                                  |        |        |        |        |
| NOTE 1: The interferer is QPSK modulated PUSCH containing data and reference symbols. Normal cyclic prefix is used. |       |                                                       |        |        |        |        |

**Table 7.6E.2.1-2: In-band blocking for NR V2X**

| NR band                                                                                                                                                                                                              | Parameter                        | Unit | Case 1                                                                           | Case 2                                                                                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|------|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| n14                                                                                                                                                                                                                  | P <sub>interferer</sub>          | dBm  | -56                                                                              | -44                                                                                        |
|                                                                                                                                                                                                                      | F <sub>interferer (offset)</sub> | MHz  | $-BW/2 - F_{\text{offset, case 1}}$<br>&<br>$BW/2 + F_{\text{offset, case 1}}$   | $\leq -BW/2 - F_{\text{offset, case 2}}$<br>&<br>$\geq BW/2 + F_{\text{offset, case 2}}$   |
|                                                                                                                                                                                                                      | F <sub>interferer</sub>          | MHz  | NOTE 2                                                                           | F <sub>DL_low</sub> – 15<br>to<br>F <sub>DL_high</sub> + 15                                |
| n38, n47                                                                                                                                                                                                             | P <sub>interferer</sub>          | dBm  | -44                                                                              | -44                                                                                        |
|                                                                                                                                                                                                                      | F <sub>interferer (offset)</sub> | MHz  | $-BW/2 - F_{\text{offset, case 1}}$<br>and<br>$BW/2 + F_{\text{offset, case 1}}$ | $\leq -BW/2 - F_{\text{offset, case 2}}$<br>and<br>$\geq BW/2 + F_{\text{offset, case 2}}$ |
|                                                                                                                                                                                                                      | F <sub>interferer</sub>          | MHz  | NOTE 2                                                                           | F <sub>DL_low</sub> – 30<br>to<br>F <sub>DL_high</sub> + 30                                |
| NOTE 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 15 MHz below or above the UE receive band.                                        |                                  |      |                                                                                  |                                                                                            |
| NOTE 2: For each carrier frequency the requirement is valid for two frequencies:<br>a. the carrier frequency $-BW/2 - F_{\text{offset, case 1}}$ and<br>b. the carrier frequency $+BW/2 + F_{\text{offset, case 1}}$ |                                  |      |                                                                                  |                                                                                            |
| NOTE 3: F <sub>interferer</sub> range values for unwanted modulated interfering signal are interferer center frequencies                                                                                             |                                  |      |                                                                                  |                                                                                            |

NOTE 4: The absolute value of the interferer offset  $F_{\text{interferer}}$  (offset) shall be further adjusted to  $\left(\left\lceil \frac{|F_{\text{interferer}}|}{SCS} + 0.5 \right\rceil \right) SCS$  MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with 15 kHz SCS.

### 7.6E.2.2 In-band blocking for V2X concurrent operation

For the inter-band concurrent NR V2X operation, the requirements specified in clause 7.6E.2.1 shall apply for the NR sidelink reception in the operating bands in Table 5.2E.2-1 and the requirements specified in clause 7.6.2 shall apply for the NR downlink reception in licensed band while all downlink carriers are active.

## 7.6E.3 Out-of-band blocking

### 7.6E.3.1 General

For NR V2X bands out-of-band band blocking is defined for an unwanted CW interfering signal falling outside a frequency range 30 MHz below or above the UE receive band. When UE is configured for NR V2X reception non-concurrent with NR uplink transmissions for NR V2X operating bands specified in Table 5.2E.1-1, the throughput of the wanted signal shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.7.2 with parameters specified in Table 7.6E.3.1-1 and Table 7.6E.3.1-2. The relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal.

For interferer frequencies across ranges 1, 2 and 3 in Table 7.6E.3.1-2, a maximum of

$$\lfloor \max \{ 24, 6 \cdot \lceil n \cdot N_{RB} / 6 \rceil \} / \min \{ \lfloor n \cdot N_{RB} / 10 \rfloor, 5 \} \rfloor$$

exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a step size of  $\min \{ BW_{\text{channel}} / 2, 5 \}$  MHz with  $N_{RB}$  the number of resource blocks in the transmission bandwidth configuration,  $BW_{\text{channel}}$  the bandwidth of the frequency channel in MHz and  $n = 1, 2, 3$  for SCS = 15, 30, 60 kHz, respectively. For these exceptions, the requirements in clause 7.7E.1 apply.

**Table 7.6E.3.1-1: Out-of-band blocking parameters for NR V2X**

| RX parameter                                  | Units | Channel bandwidth                                                  |        |        |        |        |
|-----------------------------------------------|-------|--------------------------------------------------------------------|--------|--------|--------|--------|
|                                               |       | 5 MHz <sup>2</sup>                                                 | 10 MHz | 20 MHz | 30 MHz | 40 MHz |
| Power in transmission bandwidth configuration | dBm   | $P_{\text{REFSENS\_V2X}}$ + channel bandwidth specific value below |        |        |        |        |
|                                               | dB    | 6                                                                  | 6      | 9      | 11     | 12     |

NOTE 1: Reference measurement channel is A.7.2.  
NOTE 2: The CBW is only applicable for PS UE in n14.

**Table 7.6E.3.1-2: Out of-band blocking for NR V2X**

| NR band | Parameter                    | Units | Range 1                                                                                                            | Range 2                                                                                                            | Range 3                                                                                       |
|---------|------------------------------|-------|--------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| n14     | $P_{\text{interferer}}$      | dBm   | -44                                                                                                                | -30                                                                                                                | -15                                                                                           |
|         | $F_{\text{interferer}}$ (CW) | MHz   | $-60 < f - F_{\text{DL\_low}} < -15$<br>or<br>$15 < f - F_{\text{DL\_high}} < 60$                                  | $-85 < f - F_{\text{DL\_low}} \leq -60$<br>or<br>$60 \leq f - F_{\text{DL\_high}} < 85$                            | $1 \leq f \leq F_{\text{DL\_low}} - 85$<br>or<br>$F_{\text{DL\_high}} + 85 \leq f \leq 12750$ |
| n47     | $P_{\text{interferer}}$      | dBm   | -44                                                                                                                | -30                                                                                                                | -15                                                                                           |
|         | $F_{\text{interferer}}$ (CW) | MHz   | $F_{\text{DL\_low}} - 30$ to $F_{\text{DL\_low}} - 60$<br>$F_{\text{DL\_high}} + 30$ to $F_{\text{DL\_high}} + 60$ | $F_{\text{DL\_low}} - 60$ to $F_{\text{DL\_low}} - 85$<br>$F_{\text{DL\_high}} + 60$ to $F_{\text{DL\_high}} + 85$ | $F_{\text{DL\_low}} - 85$ to 1 MHz<br>$F_{\text{DL\_high}} + 85$ to +12750 MHz                |
| n38     | $P_{\text{interferer}}$      | dBm   | -44                                                                                                                | -30                                                                                                                | -15                                                                                           |
|         | $F_{\text{interferer}}$ (CW) | MHz   | $F_{\text{DL\_low}} - 30$ to $F_{\text{DL\_low}} - 60$                                                             | $F_{\text{DL\_low}} - 60$ to $F_{\text{DL\_low}} - 85$                                                             | $F_{\text{DL\_low}} - 85$ to 1 MHz                                                            |

NOTE 1: The power level of the interferer ( $P_{\text{Interferer}}$ ) for Range 3 shall be modified to -20 dBm for  $F_{\text{Interferer}} > 4400$  MHz.

### 7.6E.3.2 Out-of-band blocking for V2X concurrent operation

For the inter-band concurrent NR V2X operation, the requirements specified in clause 7.6E.3.1 shall apply for the NR sidelink reception in Band n47 and the requirements specified in clause 7.6.3 shall apply for the NR downlink reception in licensed band while all downlink carriers are active.

## 7.6F Blocking characteristics for shared spectrum channel access

### 7.6F.1 General

The blocking characteristic is a measure of the receiver's ability to receive a wanted signal at its assigned channel frequency in the presence of an unwanted interferer on frequencies other than those of the spurious response or the adjacent channels, without this unwanted input signal causing a degradation of the performance of the receiver beyond a specified limit. The blocking performance shall apply at all frequencies except those at which a spurious response occurs.

### 7.6F.2 In-band blocking

#### 7.6F.2.1 General

In-band blocking (IBB) is defined for an unwanted interfering signal falling into the UE receive band or into the first 60 MHz below or above the UE receive band. The throughput of the wanted signal shall be  $\geq 95$  % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.6F.2.1-1 and Table 7.6F.2.1-2. The relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal.

**Table 7.6F.2.1-1: In-band blocking parameters for shared access bands**

| RX parameter                                  | Units | Channel bandwidth                                                                       |
|-----------------------------------------------|-------|-----------------------------------------------------------------------------------------|
|                                               |       | 20, 40, 60, 80, 100 MHz                                                                 |
| Power in transmission bandwidth configuration | dBm   | $\text{REFSENS} + 9 \text{ dB} + 10\log_{10}(\text{BW}_{\text{Channel}}/20) \text{ dB}$ |
| $\text{BW}_{\text{Interferer}}$               | MHz   | 20                                                                                      |
| $F_{\text{offset, case 1}}$                   | MHz   | 30                                                                                      |
| $F_{\text{offset, case 2}}$                   | MHz   | $\geq 50$                                                                               |

**Table 7.6F.2.1-2: In-band blocking for shared access bands**

| Operating band | Parameter                        | Unit | Case 1                                                                                           | Case 2                                                                                                     |
|----------------|----------------------------------|------|--------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
|                | $P_{\text{Interferer}}$          | dBm  | -56                                                                                              | -44                                                                                                        |
|                | $F_{\text{Interferer}}$ (offset) | MHz  | $-\text{CBW}/2 - F_{\text{offset, case 1}}$<br>and<br>$\text{CBW}/2 + F_{\text{offset, case 1}}$ | $\leq -\text{CBW}/2 - F_{\text{offset, case 2}}$<br>and<br>$\geq \text{CBW}/2 + F_{\text{offset, case 2}}$ |
| n46, n96, n102 | $F_{\text{Interferer}}$          |      | NOTE 2                                                                                           | $F_{\text{DL\_low}} - 3*\text{CBW}$<br>to<br>$F_{\text{DL\_high}} + 3*\text{CBW}$                          |



|         |                                                                                                                                                                                                                                                                                                                    |  |  | NOTE 4 |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--------|
| NOTE 1: | The absolute value of the interferer offset $F_{\text{interferer}}$ (offset) shall be further adjusted to $(\lceil F_{\text{interferer}} / SCS \rceil + 0.5) SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with an SCS equal to that of the wanted signal. |  |  |        |
| NOTE 2: | For each carrier frequency, the requirement applies for two interferer carrier frequencies: a: $-CBW/2 - F_{\text{offset, case 1}}$ ; b: $CBW/2 + F_{\text{offset, case 1}}$                                                                                                                                       |  |  |        |
| NOTE 3: | CBW denotes the channel bandwidth of the wanted signal                                                                                                                                                                                                                                                             |  |  |        |
| NOTE 4: | Interferer carrier frequencies in the frequency range for Case 2 shall be located at discrete frequencies in integer multiples of 20 MHz offset from $-CBW/2 - F_{\text{offset, case 2}}$ and $CBW/2 + F_{\text{offset, case 2}}$                                                                                  |  |  |        |

## 7.6F.2.2 Void

## 7.6F.2A In-band blocking for shared spectrum CA

### 7.6F.2A.1 Intra-band contiguous shared spectrum channel access CA

In-band blocking for intra-band contiguous shared access CA requirements are specified in Table 7.6F.2A.1-1. These requirements apply for any SCS specified for the channel bandwidth of the wanted signal. For the test parameters specified in Table 7.6F.2A.1-2, the throughput of each carrier shall be  $\geq 95$  % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).

**Table 7.6F.2A.1-1: In-band blocking parameters for intra-band contiguous shared access CA**

| Rx Parameter                                                                                                                                                                                                                         | Units | Shared access CA bandwidth class                   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------------------------------------------------|
|                                                                                                                                                                                                                                      |       | B, C, D, E, M, N, O                                |
| Pw in Transmission Bandwidth Configuration, per CC                                                                                                                                                                                   | dBm   | REFSENS + aggregated channel bandwidth value below |
|                                                                                                                                                                                                                                      | dB    | $9 + 10\log_{10}(BW_{\text{Channel\_CA}}/20)$      |
| $BW_{\text{Interferer}}$                                                                                                                                                                                                             | MHz   | 20                                                 |
| $F_{\text{offset, case 1}}$                                                                                                                                                                                                          | MHz   | 30                                                 |
| $F_{\text{offset, case 2}}$                                                                                                                                                                                                          | MHz   | $\geq 50$                                          |
| NOTE 1: The transmitter shall be set to 4dB below $P_{\text{CMAX\_L,f,c}}$ at the minimum UL configuration specified in Table 7.3.2-3 with $P_{\text{CMAX\_L,f,c}}$ defined in clause 6.2.4.                                         |       |                                                    |
| NOTE 2: The interferer consists of the Reference measurement channel specified in Annexes A.3.2 and A.3.3 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to Annex C.3.1 |       |                                                    |

**Table 7.6F.2A.1-2: In-band blocking for intra-band contiguous shared access CA**

| Operating band                                                                                                                                                                                                                                                                                                                                   | Parameter                        | Unit | Case 1                                                                                                                   | Case 2                                                                                                                             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|------|--------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                                                  | $P_{\text{interferer}}$          | dBm  | -56                                                                                                                      | -44                                                                                                                                |
|                                                                                                                                                                                                                                                                                                                                                  | $F_{\text{interferer}}$ (offset) | MHz  | $-BW_{\text{channel CA}}/2 - F_{\text{offset, case 1}}$<br>and<br>$BW_{\text{channel CA}}/2 + F_{\text{offset, case 1}}$ | $\leq -BW_{\text{channel CA}}/2 - F_{\text{offset, case 2}}$<br>and<br>$\geq BW_{\text{channel CA}}/2 + F_{\text{offset, case 2}}$ |
| n46                                                                                                                                                                                                                                                                                                                                              | $F_{\text{interferer}}$          | MHz  | NOTE 2                                                                                                                   | $F_{\text{DL\_low}} - 3 * BW_{\text{channel CA}}$<br>to<br>$F_{\text{DL\_high}} + 3 * BW_{\text{channel CA}}$<br>NOTE 4            |
| NOTE 1: The absolute value of the interferer offset $F_{\text{interferer}}$ (offset) shall be further adjusted to $(\lceil F_{\text{interferer}} / SCS \rceil + 0.5) SCS$ MHz with SCS the sub-carrier spacing of the carrier closest to the interferer in MHz. The interferer is an NR signal with an SCS equal to that of the closest carrier. |                                  |      |                                                                                                                          |                                                                                                                                    |

NOTE 2: For each carrier frequency, the requirement applies for two interferer carrier frequencies: a:  $-BW_{\text{channel CA}}/2 - F_{\text{offset, case 1}}$ ; b:  $BW_{\text{channel CA}}/2 + F_{\text{offset, case 1}}$   
 NOTE 3:  $BW_{\text{channel CA}}$  denotes the aggregated channel bandwidth of the wanted signal  
 NOTE 4: Interferer carrier frequencies in the frequency range for Case 2 shall be located at discrete frequencies in integer multiples of 20 MHz offset from  $-BW_{\text{channel CA}}/2 - F_{\text{offset, case 2}}$  and  $BW_{\text{channel CA}}/2 + F_{\text{offset, case 2}}$

## 7.6F.3 Out-of-band blocking

### 7.6F.3.1 General

Out-of-band band blocking is defined for an unwanted CW interfering signal falling outside a frequency range 60 MHz or greater below or above the UE receive band. The throughput of the wanted signal shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.6F.3.1-1 and Table 7.6F.3.1-2. The relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal.

**Table 7.6F.3.1-1: Out-of-band blocking parameters for shared access bands**

| RX parameter                                                                                                                                                                                  | Units | Channel bandwidth       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------------|
|                                                                                                                                                                                               |       | 20, 40, 60, 80, 100 MHz |
| Power in transmission bandwidth configuration                                                                                                                                                 | dBm   | REFSENS + 9 dB          |
| NOTE 1: The transmitter shall be set to 4 dB below $P_{\text{CMAX\_L,f,c}}$ at the minimum UL configuration specified in Table 7.3.2-3 with $P_{\text{CMAX\_L,f,c}}$ defined in clause 6.2.4. |       |                         |

**Table 7.6F.3.1-2: Out of-band blocking for shared access bands**

| Operating band                                                                                                                                                                                                                                               | Parameter                    | Unit | Range1 | Range 2                                                                                                                                                                           | Range 3                                                                                                                                                         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                                              | $P_{\text{interferer}}$      | dBm  | -44    | -30                                                                                                                                                                               | -15                                                                                                                                                             |
| n46, n96                                                                                                                                                                                                                                                     | $F_{\text{interferer}}$ (CW) | MHz  | N/A    | $-200 < f - F_{\text{DL\_low}} \leq -3 \cdot \text{CBW}$<br>or<br>$3 \cdot \text{CBW} \leq f - F_{\text{DL\_high}} < 200$                                                         | $1 \leq f \leq F_{\text{DL\_low}} - \text{MAX}(200, 3 \cdot \text{CBW})$<br>or<br>$F_{\text{DL\_high}} + \text{MAX}(200, 3 \cdot \text{CBW}) \leq f \leq 12750$ |
| n102                                                                                                                                                                                                                                                         | $F_{\text{interferer}}$ (CW) | MHz  | N/A    | $-200 < f - F_{\text{DL\_low}} \leq -3 \cdot \text{CBW}$<br>or<br>$F_{\text{DL\_high}} + \text{MAX}(200, 3 \cdot \text{CBW}) \leq f < 7125 + \text{MAX}(375, 3 \cdot \text{CBW})$ | $1 \leq f \leq F_{\text{DL\_low}} - \text{MAX}(200, 3 \cdot \text{CBW})$<br>or<br>$7125 + \text{MAX}(375, 3 \cdot \text{CBW}) \leq f \leq 12750$                |
| NOTE 1: The power level of the interferer ( $P_{\text{interferer}}$ ) for Range 3 shall be modified to -20 dBm for $F_{\text{interferer}} > 4200$ MHz.                                                                                                       |                              |      |        |                                                                                                                                                                                   |                                                                                                                                                                 |
| NOTE 2: CBW denotes the channel bandwidth of the wanted signal                                                                                                                                                                                               |                              |      |        |                                                                                                                                                                                   |                                                                                                                                                                 |
| NOTE 3: For band n102, the power level of the interferer ( $P_{\text{interferer}}$ ) for Range 2 shall be modified to -33dBm for the range $F_{\text{DL\_high}} + \text{MAX}(200, 3 \cdot \text{CBW}) \leq f < 7125 + \text{MAX}(375, 3 \cdot \text{CBW})$ . |                              |      |        |                                                                                                                                                                                   |                                                                                                                                                                 |

For interferer frequencies across ranges 1, 2 and 3 in Table 7.6F.3.1-2, a maximum of

$$\lfloor \max \{24, 6 \cdot \lceil n \cdot N_{\text{RB}} / 6 \rceil \} / \min \{ \lfloor n \cdot N_{\text{RB}} / 10 \rfloor, 5 \} \rfloor$$

exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a step size of  $\min(\lfloor \text{CBW} / 2 \rfloor, 5)$  MHz with  $N_{\text{RB}}$  the number of resource blocks in the downlink transmission bandwidth configuration, CBW the bandwidth of the frequency channel in MHz and  $n = 1, 2, 3$  for SCS = 15, 30, 60 kHz, respectively. For these exceptions, the requirements in clause 7.7F apply.

## 7.6F.3.2 Void

## 7.6F.3A Out-of-band blocking for shared spectrum CA

## 7.6F.3A.1 Intra-band contiguous shared spectrum channel access CA

Out-of-band blocking for intra-band contiguous shared access CA requirements are specified in Table 7.6F.3A.1-1. These requirements apply for any SCS specified for the channel bandwidth of the wanted signal. For the test parameters specified in Table 7.6F.3A.1-2, the throughput of each carrier shall be  $\geq 95$  % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).

**Table 7.6F.3A.1-1: Out-of-band blocking parameters for intra-band contiguous shared access CA**

| Rx Parameter                                                                                                                                                                                  | Units | Shared access CA bandwidth class                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------------------------------------------------|
|                                                                                                                                                                                               |       | B, C, D, E, M, N, O                               |
| Pw in Transmission Bandwidth Configuration, per CC                                                                                                                                            | dBm   | REFSENS + CA bandwidth class specific value below |
|                                                                                                                                                                                               | dB    | 9                                                 |
| NOTE 1: The transmitter shall be set to 4dB below $P_{\text{CMAX\_L,f,c}}$ at the minimum UL configuration specified in Table 7.3F.2-3 with $P_{\text{CMAX\_L,f,c}}$ defined in clause 6.2.4. |       |                                                   |

**Table 7.6F.3A.1-2: Out of-band blocking for intra-band contiguous CA**

| Operating band                                                                                                                                          | Parameter                    | Unit | Range1 | Range 2                                                                                                                                                           | Range 3                                                                                                                                                                                                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                         | $P_{\text{interferer}}$      | dBm  | -45    | -30                                                                                                                                                               | -15                                                                                                                                                                                                     |
| n46                                                                                                                                                     | $F_{\text{interferer}}$ (CW) | MHz  | N/A    | $-200 < f - F_{\text{DL\_low}} \leq -3 \cdot \text{BW}_{\text{Channel\_CA}}$<br>or<br>$3 \cdot \text{BW}_{\text{Channel\_CA}} \leq f - F_{\text{DL\_high}} < 200$ | $1 \leq f \leq F_{\text{DL\_low}} - \text{MAX}(200, 3 \cdot \text{BW}_{\text{Channel\_CA}})$<br>or<br>$F_{\text{DL\_high}} + \text{MAX}(200, 3 \cdot \text{BW}_{\text{Channel\_CA}}) \leq f \leq 12750$ |
| NOTE 1: The power level of the interferer ( $P_{\text{interferer}}$ ) for Range 3 shall be modified to -20 dBm, for $F_{\text{interferer}} > 4200$ MHz. |                              |      |        |                                                                                                                                                                   |                                                                                                                                                                                                         |

## 7.7 Spurious response

Spurious response is a measure of the ability of the receiver to receive a wanted signal on its assigned channel frequency without exceeding a given degradation due to the presence of an unwanted CW interfering signal at any other frequency for which a response is obtained, i.e. for which the out-of-band blocking limit as specified in clause 7.6.3 is not met.

The throughput shall be  $\geq 95$  % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters for the wanted signal as specified in Table 7.7-1 for NR bands with  $F_{\text{DL\_high}} < 2700$  MHz and  $F_{\text{UL\_high}} < 2700$  MHz and in Table 7.7-1a for NR bands with  $F_{\text{DL\_high}} \geq 3300$  MHz and  $F_{\text{UL\_high}} \geq 3300$  MHz and for the interferer as specified in Table 7.7-2. The relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal. For operating bands with an unpaired DL part (as noted in Table 5.2-1), the requirements only apply for carriers assigned in the paired part.

**Table 7.7-1: Spurious response parameters for NR bands with  $F_{DL\_high} < 2700$  MHz and  $F_{UL\_high} < 2700$  MHz**

| RX parameter                                                                                                                                                                                | Units | Channel bandwidth (MHz) |                |                                                                     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------------|----------------|---------------------------------------------------------------------|
|                                                                                                                                                                                             |       | 5, 10                   | 15             | 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100                     |
| Power in transmission bandwidth configuration <sup>2</sup>                                                                                                                                  | dBm   | REFSENS + 6 dB          | REFSENS + 7 dB | REFSENS + (9 + 10log <sub>10</sub> (BW <sub>Channel</sub> / 20)) dB |
| NOTE 1: The transmitter shall be set to 4 dB below P <sub>CMAX_L,f,c</sub> at the minimum UL configuration specified in Table 7.3.2-3 with P <sub>CMAX_L,f,c</sub> defined in clause 6.2.4. |       |                         |                |                                                                     |
| NOTE 2: 10log <sub>10</sub> (x) is rounded to the next higher 0.5dB value.                                                                                                                  |       |                         |                |                                                                     |

**Table 7.7.1-1a: Spurious response parameters for NR bands with  $F_{DL\_low} \geq 3300$  MHz and  $F_{UL\_low} \geq 3300$  MHz**

| RX parameter                                                                                                                                                                                | Units | Channel bandwidth (MHz) |                |                                                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------------|----------------|-------------------------------------------------|
|                                                                                                                                                                                             |       | 10                      | 15             | 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100 |
| Power in transmission bandwidth configuration                                                                                                                                               | dBm   | REFSENS + 6 dB          | REFSENS + 7 dB | REFSENS + 9 dB                                  |
| NOTE 1: The transmitter shall be set to 4 dB below P <sub>CMAX_L,f,c</sub> at the minimum UL configuration specified in Table 7.3.2-3 with P <sub>CMAX_L,f,c</sub> defined in clause 6.2.4. |       |                         |                |                                                 |

**Table 7.7-2: Spurious response**

| Parameter                    | Unit | Level                         |
|------------------------------|------|-------------------------------|
| P <sub>Interferer</sub> (CW) | dBm  | -44                           |
| F <sub>Interferer</sub>      | MHz  | Spurious response frequencies |

## 7.7A Spurious response for CA

### 7.7A.1 Spurious response for Intra-band contiguous CA

**Table 7.7A-1: Spurious response parameters for intra-band contiguous CA**

| RX parameter                                                                                                                                                                                | Units | NR CA bandwidth class                             |   |   |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------------------------------------------------|---|---|--|
|                                                                                                                                                                                             |       | B                                                 | C | D |  |
| Power in transmission bandwidth configuration                                                                                                                                               | dBm   | REFSENS + CA bandwidth class specific value below |   |   |  |
|                                                                                                                                                                                             | dB    | 9                                                 | 9 | 9 |  |
| NOTE 1: The transmitter shall be set to 4 dB below P <sub>CMAX_L,f,c</sub> at the minimum UL configuration specified in Table 7.3.2-3 with P <sub>CMAX_L,f,c</sub> defined in clause 6.2.4. |       |                                                   |   |   |  |

**Table 7.7A-2: Spurious response for CA**

| Parameter                    | Unit | Level                         |
|------------------------------|------|-------------------------------|
| P <sub>Interferer</sub> (CW) | dBm  | -44                           |
| F <sub>Interferer</sub>      | MHz  | Spurious response frequencies |

**Table 7.7A-3: Void****Table 7.7A-4: void**

## 7.7A.2 Spurious response for Intra-band non-contiguous CA

For intra-band non-contiguous carrier aggregation with one uplink carrier and two or more downlink sub-blocks, the spurious response requirements are defined with the uplink configuration in accordance with Table 7.3A.2.2-1. For this uplink configuration, the UE shall meet the requirements for each sub-block as specified in clauses 7.7 and 7.7A.1 for one component carrier and two component carriers per sub-block, respectively. The requirements apply with all downlink carriers active.

The throughput of each carrier shall be  $\geq 95$  % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).

## 7.7A.3 Spurious response for Inter-band CA

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one NR band, the spurious response are defined with the uplink active on the band(s) other than the band whose downlink is being tested. The UE shall meet the requirements specified in clause 7.7 for each component carrier while all downlink carriers are active.

For the UE which supports inter-band CA configuration in Table 7.3A.3.2.1-1,  $P_{\text{interferer}}$  power defined in Table 7.7-2 and Table 7.7F.1-2 for shared spectrum channel access is increased by the amount given by  $\Delta R_{\text{B,c}}$  in Table 7.3A.3.2.1-1 and in Table 7.3F.3-1 for shared spectrum channel access .

The throughput of each carrier shall be  $\geq 95$  % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).

## 7.7B Spurious response for NR-DC

For inter-band NR-DC configurations, the spurious response for the corresponding inter-band CA configuration as specified in clause 7.7A applies.

## 7.7D Spurious response for UL MIMO

For UE with two transmitter antenna connectors in closed-loop spatial multiplexing scheme, the minimum requirements specified in clause 7.7 shall be met with the UL MIMO configurations described in clause 6.2D.1 and in clause 6.2F.1D for shared spectrum access operation. For UL MIMO, the parameter  $P_{\text{CMAX}_L}$  is defined as the total transmitter power over the two transmit antenna connectors.

## 7.7E Spurious response for V2X

### 7.7E.1 General

Spurious response is a measure of the receiver's ability to receive a wanted signal on its assigned channel frequency without exceeding a given degradation due to the presence of an unwanted CW interfering signal at any other frequency for which a response is obtained, i.e. for which the out-of-band blocking limit as specified in clause 7.6E.3.1 is not met.

When UE is configured for NR V2X reception non-concurrent with NR uplink transmissions for NR V2X operating bands specified in Table 5.2E.1-1, the throughput shall be  $\geq 95$  % of the maximum throughput of the reference measurement channels as specified in Annexes A.7.2 with parameters for the wanted signal as specified in Table 7.7E.1-1 and Table 7.7E.1-2 for NR V2X bands. The relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal.

**Table 7.7E.1-1: Spurious response parameters for NR V2X**

| RX parameter                                         | Units | Channel bandwidth                                                  |        |        |        |        |
|------------------------------------------------------|-------|--------------------------------------------------------------------|--------|--------|--------|--------|
|                                                      |       | 5 MHz <sup>2</sup>                                                 | 10 MHz | 20 MHz | 30 MHz | 40 MHz |
| Power in transmission bandwidth configuration        | dBm   | $P_{\text{REFSENS\_V2X}}$ + channel bandwidth specific value below |        |        |        |        |
|                                                      | dB    | 6                                                                  | 6      | 9      | 11     | 12     |
| NOTE 1: Reference measurement channel is A.7.2       |       |                                                                    |        |        |        |        |
| NOTE 2: The CBW is only applicable for PS UE in n14. |       |                                                                    |        |        |        |        |

**Table 7.7E.1-2: Spurious response for NR V2X**

| Parameter                    | Unit | Level                         |
|------------------------------|------|-------------------------------|
| $P_{\text{Interferer}}$ (CW) | dBm  | -44                           |
| $F_{\text{Interferer}}$      | MHz  | Spurious response frequencies |

## 7.7E.2 Spurious response for V2X concurrent operation

For the inter-band concurrent NR V2X operation, the requirements specified in clause 7.7E.1 shall apply for the NR sidelink reception in the operating bands in Table 5.2E.2-1 and the requirements specified in clause 7.7 shall apply for the NR downlink reception in licensed band while all downlink carriers are active.

## 7.7F Spurious response for shared spectrum channel access

### 7.7F.1 General

For spurious responses, the throughput of the wanted signal shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.7F.1-1 and Table 7.7F.1-2. The relative throughput requirement shall be met for any SCS at any other frequency at which a response is obtained i.e. for which the limit as specified in clause 7.6F.3.1 is not met.

**Table 7.7F.1-1: Spurious response parameters for shared access bands**

| RX parameter                                                                                                                                                                                  | Units | Channel bandwidth       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------------|
|                                                                                                                                                                                               |       | 20, 40, 60, 80, 100 MHz |
| Power in transmission bandwidth configuration                                                                                                                                                 | dBm   | REFSENS + 9 dB          |
| NOTE 1: The transmitter shall be set to 4 dB below $P_{\text{CMAX\_L,f,c}}$ at the minimum UL configuration specified in Table 7.3.2-3 with $P_{\text{CMAX\_L,f,c}}$ defined in clause 6.2.4. |       |                         |

**Table 7.7F.1-2: Spurious response for shared spectrum channel access**

| Parameter                    | Unit | Level                         |
|------------------------------|------|-------------------------------|
| $P_{\text{Interferer}}$ (CW) | dBm  | -44                           |
| $F_{\text{Interferer}}$      | MHz  | Spurious response frequencies |

### 7.7F.1A Spurious response for shared spectrum channel access CA

#### 7.7F.1A.1 Intra-band contiguous shared spectrum channel access CA

For spurious responses, the throughput of each carrier shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1

FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.7F.1A.1-1 and Table 7.7F.1A.1-2. The relative throughput requirement shall be met for any SCS at any other frequency at which a response is obtained i.e. for which the limit as specified in clause 7.6F.3.2 is not met.

**Table 7.7F.1A.1-1: Spurious response parameters for intra-band contiguous shared access CA**

| Rx Parameter                                                                                                                                                                                                      | Units | Shared access CA bandwidth class                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------------------------------------------------|
|                                                                                                                                                                                                                   |       | B, C, D, E, I, M, N, O                            |
| P <sub>w</sub> in Transmission Bandwidth Configuration, per CC                                                                                                                                                    | dBm   | REFSENS + CA bandwidth class specific value below |
|                                                                                                                                                                                                                   | dB    | 9                                                 |
| NOTE 1: The transmitter shall be set to 4dB below P <sub>C<sub>MAX</sub>_L,f,c</sub> at the minimum UL configuration specified in Table 7.3F.2-3 with P <sub>C<sub>MAX</sub>_L,f,c</sub> defined in clause 6.2.4. |       |                                                   |

**Table 7.7F.1A.1-2: Spurious response for intra-band contiguous shared access CA**

| Parameter                    | Unit | Level                         |
|------------------------------|------|-------------------------------|
| P <sub>Interferer</sub> (CW) | dBm  | -44                           |
| F <sub>Interferer</sub>      | MHz  | Spurious response frequencies |

## 7.7F.2 Void

# 7.8 Intermodulation characteristics

## 7.8.1 General

Intermodulation response rejection is a measure of the capability of the receiver to receive a wanted signal on its assigned channel frequency in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal

## 7.8.2 Wide band Intermodulation

The wide band intermodulation requirement is defined using a CW carrier and modulated NR signal as interferer 1 and interferer 2 respectively.

The throughput shall be  $\geq 95$  % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.8.2-1 for NR bands with  $F_{DL\_high} < 2700$  MHz and  $F_{UL\_high} < 2700$  MHz and Table 7.8.2-2 for NR bands with  $F_{DL\_low} \geq 3300$  MHz and  $F_{UL\_low} \geq 3300$  MHz. The relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal. For operating bands with an unpaired DL part (as noted in Table 5.2-1), the requirements only apply for carriers assigned in the paired part.

**Table 7.8.2-1: Wide band intermodulation parameters for NR bands with  $F_{DL\_high} < 2700$  MHz and  $F_{UL\_high} < 2700$  MHz**

| Rx parameter                                                                | Units | Channel bandwidth (MHz) |                |                                                                     |
|-----------------------------------------------------------------------------|-------|-------------------------|----------------|---------------------------------------------------------------------|
|                                                                             |       | 5, 10                   | 15             | 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100                     |
| P <sub>w</sub> in Transmission Bandwidth Configuration, per CC <sup>5</sup> | dBm   | REFSENS + 6 dB          | REFSENS + 7 dB | REFSENS + (9 + 10log <sub>10</sub> (BW <sub>Channel</sub> / 20)) dB |
| P <sub>Interferer 1</sub> (CW)                                              | dBm   | -46                     |                |                                                                     |
| P <sub>Interferer 2</sub> (Modulated)                                       | dBm   | -46                     |                |                                                                     |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |                                                                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----------------------------------------------------------------------|
| $BW_{\text{Interferer 2}}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | MHz | 5                                                                     |
| $F_{\text{Interferer 1 (Offset)}}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | MHz | $-BW_{\text{Channel}}/2 - 7.5$<br>/<br>$+BW_{\text{Channel}}/2 + 7.5$ |
| $F_{\text{Interferer 2 (Offset)}}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | MHz | $2 \cdot F_{\text{Interferer 1}}$                                     |
| <p>NOTE 1: The transmitter shall be set to 4 dB below <math>P_{\text{CMAX\_L,f,c}}</math> at the minimum UL configuration specified in Table 7.3.2-3 with <math>P_{\text{CMAX\_L,f,c}}</math> defined in clause 6.2.4.</p> <p>NOTE 2: Reference measurement channel is specified in Annexes A.2.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).</p> <p>NOTE 3: The modulated interferer consists of the Reference measurement channel specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1 and 15 kHz SCS.</p> <p>NOTE 4: The <math>F_{\text{Interferer 1}}</math> (offset) is the frequency separation of the center frequency of the carrier closest to the interferer and the center frequency of the CW interferer and <math>F_{\text{Interferer 2}}</math> (offset) is the frequency separation of the center frequency of the carrier closest to the interferer and the center frequency of the modulated interferer.</p> <p>NOTE 5: <math>10\log_{10}(x)</math> is rounded to the next higher 0.5dB value.</p> |     |                                                                       |

**Table 7.8.2-2: Wide band intermodulation parameters for NR bands with  $F_{\text{DL\_low}} \geq 3300$  MHz and  $F_{\text{UL\_low}} \geq 3300$  MHz**

| Rx parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Units | Channel bandwidth (MHz)                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       | 10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100 |
| $P_w$ in Transmission Bandwidth Configuration, per CC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | dBm   | REFSENS + 6 dB                                          |
| $P_{\text{Interferer 1 (CW)}}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | dBm   | -46                                                     |
| $P_{\text{Interferer 2 (Modulated)}}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | dBm   | -46                                                     |
| $BW_{\text{Interferer 2}}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | MHz   | $BW_{\text{Channel}}$                                   |
| $F_{\text{Interferer 1 (Offset)}}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | MHz   | $-2BW_{\text{Channel}}$<br>/<br>$+2BW_{\text{Channel}}$ |
| $F_{\text{Interferer 2 (Offset)}}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | MHz   | $2 \cdot F_{\text{Interferer 1}}$                       |
| <p>NOTE 1: The transmitter shall be set to 4dB below <math>P_{\text{CMAX\_L,f,c}}</math> at the minimum UL configuration specified in Table 7.3.2-3 with <math>P_{\text{CMAX\_L,f,c}}</math> defined in clause 6.2.4.</p> <p>NOTE 2: Reference measurement channel is specified in Annexes A.2.2, A.2.3, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).</p> <p>NOTE 3: The modulated interferer consists of the Reference measurement channel specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1 and the same SCS as the wanted signal.</p> <p>NOTE 4: The <math>F_{\text{Interferer 1}}</math> (offset) is the frequency separation of the center frequency of the carrier closest to the interferer and the center frequency of the CW interferer and <math>F_{\text{Interferer 2}}</math> (offset) is the frequency separation of the center frequency of the carrier closest to the interferer and the center frequency of the modulated interferer.</p> |       |                                                         |



## 7.8A Intermodulation characteristics for CA

### 7.8A.1 General

### 7.8A.2 Wide band intermodulation for CA

#### 7.8A.2.1 Wide band intermodulation for Intra-band contiguous CA

**Table 7.8A.2.1-1: Wide band intermodulation parameters for intra-band contiguous CA with  $F_{DL\_low} \geq 3300$  MHz and  $F_{UL\_low} \geq 3300$  MHz**

| Rx parameter                                                   | Units                                                                                                                                                                                                                                                                                                                                                                       | NR CA bandwidth class                                    |                                                               |                                                          |  |
|----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|---------------------------------------------------------------|----------------------------------------------------------|--|
|                                                                |                                                                                                                                                                                                                                                                                                                                                                             | B                                                        | C                                                             | D                                                        |  |
| P <sub>w</sub> in Transmission Bandwidth Configuration, per CC | dBm                                                                                                                                                                                                                                                                                                                                                                         | REFSENS + 10 dB                                          | REFSENS + 6 dB                                                | REFSENS + 13.8 dB                                        |  |
| P <sub>Interferer 1</sub> (CW)                                 | dBm                                                                                                                                                                                                                                                                                                                                                                         | -46                                                      |                                                               |                                                          |  |
| P <sub>Interferer 2</sub> (Modulated)                          | dBm                                                                                                                                                                                                                                                                                                                                                                         | -46                                                      |                                                               |                                                          |  |
| BW <sub>Interferer 2</sub>                                     | MHz                                                                                                                                                                                                                                                                                                                                                                         | 20                                                       | BW <sub>Channel_CA</sub>                                      | 50                                                       |  |
| F <sub>Interferer 1</sub> (Offset)                             | MHz                                                                                                                                                                                                                                                                                                                                                                         | -F <sub>offset</sub> -30<br>/<br>F <sub>offset</sub> +30 | -2BW <sub>Channel_CA</sub><br>/<br>+2BW <sub>Channel_CA</sub> | -F <sub>offset</sub> -75<br>/<br>F <sub>offset</sub> +75 |  |
| F <sub>Interferer 2</sub> (Offset)                             | MHz                                                                                                                                                                                                                                                                                                                                                                         |                                                          | 2*F <sub>Interferer 1</sub>                                   |                                                          |  |
| NOTE 1:                                                        | The transmitter shall be set to 4 dB below P <sub>CMAX_L,f,c</sub> at the minimum UL configuration specified in Table 7.3.2-3 with P <sub>CMAX_L,f,c</sub> defined in clause 6.2.4.                                                                                                                                                                                         |                                                          |                                                               |                                                          |  |
| NOTE 2:                                                        | Reference measurement channel is specified in Annexes A.2.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).                                                                                                                                                                                   |                                                          |                                                               |                                                          |  |
| NOTE 3:                                                        | The modulated interferer consists of the Reference measurement channel specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1 and the same SCS as the closest carrier.                                                                                                           |                                                          |                                                               |                                                          |  |
| NOTE 4:                                                        | The F <sub>interferer 1</sub> (offset) is the frequency separation of the center frequency of the carrier closest to the interferer and the center frequency of the CW interferer and F <sub>interferer 2</sub> (offset) is the frequency separation of the center frequency of the carrier closest to the interferer and the center frequency of the modulated interferer. |                                                          |                                                               |                                                          |  |

**Table 7.8A.2.1-2: Wide band intermodulation parameters for intra-band contiguous CA with  $F_{DL\_low} < 2700$  MHz and  $F_{UL\_low} < 2700$  MHz**

| Rx parameter                                                                                                                                                                                     | Units | NR CA bandwidth class                      |                                            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------------------------------------------|--------------------------------------------|
|                                                                                                                                                                                                  |       | B                                          | C                                          |
| $P_w$ in Transmission Bandwidth Configuration, per CC                                                                                                                                            | dBm   | REFSENS + 16 dB                            | REFSENS + 19 dB                            |
| $P_{Interferer\ 1}$ (CW)                                                                                                                                                                         | dBm   | -46                                        | -46                                        |
| $P_{Interferer\ 2}$ (Modulated)                                                                                                                                                                  | dBm   | -46                                        | -46                                        |
| $BW_{Interferer\ 2}$                                                                                                                                                                             | MHz   | 5                                          | 5                                          |
| $F_{Interferer\ 1}$ (Offset)                                                                                                                                                                     | MHz   | $-F_{offset}-7.5$<br>/<br>$F_{offset}+7.5$ | $-F_{offset}-7.5$<br>/<br>$F_{offset}+7.5$ |
| $F_{Interferer\ 2}$ (Offset)                                                                                                                                                                     | MHz   | $2 \cdot F_{Interferer\ 1}$                | $2 \cdot F_{Interferer\ 1}$                |
| NOTE 1: The transmitter shall be set to 4 dB below $P_{CMAX\_L,f,c}$ at the minimum UL configuration specified in Table 7.3.2-3 with $P_{CMAX\_L,f,c}$ defined in clause 6.2.4.                  |       |                                            |                                            |
| NOTE 2: Reference measurement channel is specified in Annexes A.2.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) |       |                                            |                                            |

NOTE 3: The modulated interferer consists of the Reference measurement channel specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1 and the same SCS as the 15 kHz SCS.

NOTE 4: The  $F_{\text{interferer } 1}$  (offset) is the frequency separation of the center frequency of the carrier closest to the interferer and the center frequency of the CW interferer and  $F_{\text{interferer } 2}$  (offset) is the frequency separation of the center frequency of the carrier closest to the interferer and the center frequency of the modulated interferer.

### 7.8A.2.2 Wide band intermodulation for Intra-band non-contiguous CA

For intra-band non-contiguous carrier aggregation with one uplink carrier and two or more downlink sub-blocks, the wide band intermodulation requirements are defined with the uplink configuration in accordance with Table 7.3A.2.2-1. For this uplink configuration, the UE shall meet the requirements for each sub-block as specified in clause 7.8.2 and 7.8A.2.1 for one component carrier and two component carriers per sub-block, respectively. The requirements apply for out-of-gap interferers while all downlink carriers are active.

The throughput of each carrier shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).

### 7.8A.2.3 Wide band intermodulation for Inter-band CA

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one NR band, the wide band intermodulation requirements are defined with the uplink active on the band(s) other than the band whose downlink is being tested. The UE shall meet the requirements specified in clause 7.8 for each component carrier while all downlink carriers are active.

For the UE which supports inter-band CA configuration in Table 7.3A.3.2.1-1,  $P_{\text{interferer}}$  power defined in Table 7.8.2-1 and 7.8.2-2 and Table 7.8F.2-1 for shared spectrum channel access is increased by the amount given by  $\Delta R_{\text{IB,c}}$  in Table 7.3A.3.2.1-1 in Table 7.3F.3-1 for shared spectrum channel access.

The throughput of each carrier shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).

## 7.8B Intermodulation characteristics for NR-DC

For inter-band NR-DC configurations, the intermodulation characteristics for the corresponding inter-band CA configuration as specified in clause 7.8A applies.

## 7.8D Intermodulation characteristics for UL MIMO

For UE(s) with two transmitter antenna connectors in closed-loop spatial multiplexing scheme, the minimum requirements in clause 7.8 shall be met with the UL MIMO configurations described in clause 6.2D.1 and in clause 6.2F.1D for shared spectrum access operation. For UL MIMO, the parameter  $P_{\text{C}_{\text{MAX}_L}}$  is defined as the total transmitter power over the two transmit antenna connectors.

## 7.8E Intermodulation characteristics for V2X

### 7.8E.1 General

Intermodulation response rejection is a measure of the capability of the receiver to receive a wanted signal on its assigned channel frequency in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal.

## 7.8E.2 Wide band Intermodulation

### 7.8E.2.1 General

The wide band intermodulation requirement is defined using modulated NR carrier and a CW signal as interferer 1 and interferer 2 respectively. When UE is configured for NR V2X reception non-concurrent with NR uplink transmissions for NR V2X operating bands specified in Table 5.2E.1-1, the throughput shall be  $\geq 95$  % of the maximum throughput of the reference measurement channels as specified in Annexes A.7.2 with parameters specified in Table 7.8E.2-1 for NR V2X bands. The relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal.

**Table 7.8E.2-1: Wide band intermodulation parameters for NR V2X**

| NR band                                                                                                             | Rx parameter                                   | Units | Channel bandwidth                                                 |        |        |        |
|---------------------------------------------------------------------------------------------------------------------|------------------------------------------------|-------|-------------------------------------------------------------------|--------|--------|--------|
|                                                                                                                     |                                                |       | 10 MHz                                                            | 20 MHz | 30 MHz | 40 MHz |
| n38, n47                                                                                                            | Power in Transmission Bandwidth Configuration  | dBm   | P <sub>REFSENS_V2X</sub> + channel bandwidth specific value below |        |        |        |
|                                                                                                                     |                                                | dB    | 6                                                                 | 9      | 11     | 12     |
|                                                                                                                     | P <sub>Interferer 1</sub> (CW)                 | dBm   | -46                                                               |        |        |        |
|                                                                                                                     | P <sub>Interferer 2</sub> (Modulated)          | dBm   | -46                                                               |        |        |        |
|                                                                                                                     | BW <sub>Interferer 2</sub>                     | MHz   | 10MHz                                                             |        |        |        |
|                                                                                                                     | F <sub>Interferer 1</sub> (Offset)             | MHz   | -BW/2 – 15<br>/<br>+BW/2 + 15                                     |        |        |        |
|                                                                                                                     | F <sub>Interferer 2</sub> (Offset)             | MHz   | 2 * F <sub>Interferer 1</sub>                                     |        |        |        |
|                                                                                                                     | NOTE 1: Reference measurement channel is A.7.2 |       |                                                                   |        |        |        |
| NOTE 2: The interferer is QPSK modulated PUSCH containing data and reference symbols. Normal cyclic prefix is used. |                                                |       |                                                                   |        |        |        |

**Table 7.8E.2-1a: Wide band intermodulation parameters in n14**

| NR band                                                                                                             | Rx parameter                                    | Unit<br>s | Channel bandwidth                                                 |        |        |        |        |
|---------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|-----------|-------------------------------------------------------------------|--------|--------|--------|--------|
|                                                                                                                     |                                                 |           | 5 MHz                                                             | 10 MHz | 20 MHz | 30 MHz | 40 MHz |
| n14                                                                                                                 | Power in Transmission Bandwidth Configuration   | dBm       | P <sub>REFSENS V2X</sub> + channel bandwidth specific value below |        |        |        |        |
|                                                                                                                     |                                                 | dB        | 6                                                                 | 6      |        |        |        |
|                                                                                                                     | P <sub>Interferer 1 (CW)</sub>                  | dBm       | -46                                                               |        |        |        |        |
|                                                                                                                     | P <sub>Interferer 2 (Modulated)</sub>           | dBm       | -46                                                               |        |        |        |        |
|                                                                                                                     | BW <sub>Interferer 2</sub>                      | MHz       | 5MHz                                                              |        |        |        |        |
|                                                                                                                     | F <sub>Interferer 1 (Offset)</sub>              | MHz       | -BW/2 – 7.5<br>/<br>+BW/2 + 7.5                                   |        |        |        |        |
|                                                                                                                     | F <sub>Interferer 2 (Offset)</sub>              | MHz       | 2 * F <sub>Interferer 1</sub>                                     |        |        |        |        |
|                                                                                                                     | NOTE 1: Reference measurement channel is A.7.2. |           |                                                                   |        |        |        |        |
| NOTE 2: The interferer is QPSK modulated PSSCH containing data and reference symbols. Normal cyclic prefix is used. |                                                 |           |                                                                   |        |        |        |        |

### 7.8E.2.2 Wide band Intermodulation for V2X concurrent operation

For the inter-band concurrent NR V2X operation, the requirements specified in clause 7.8E.2.1 shall apply for the NR sidelink reception in the operating bands in Table 5.2E.2-1 and the requirements specified in clause 7.8 shall apply for the NR downlink reception in licensed band while all downlink carriers are active.

## 7.8F Intermodulation characteristics for shared spectrum channel access

### 7.8F.1 General

Intermodulation response rejection is a measure of the capability of the receiver to receive a wanted signal on its assigned channel frequency in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal.

### 7.8F.2 Wide band Intermodulation

The wide band intermodulation requirement is defined using a CW carrier and modulated NR signal as interferer 1 and interferer 2 respectively.

Instead of the general wideband intermodulation requirements specified in clause 7.8.2, the throughput shall be  $\geq 95\%$  of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.8F.2-1. The relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal.

**Table 7.8F.2-1: Wide band intermodulation parameters for shared spectrum channel access**

| Rx parameter                                                                                                                                                                                                                                                                                                                                                                        | Units | Channel bandwidth                                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-----------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                     |       | 20, 40, 60, 80, 100 MHz                                   |
| $P_w$ in Transmission Bandwidth configuration, per CC                                                                                                                                                                                                                                                                                                                               | dBm   | REFSENS + 9 dB + $10\log_{10}(BW_{\text{Channel}}/20)$ dB |
| $P_{\text{Interferer 1 (CW)}}$                                                                                                                                                                                                                                                                                                                                                      | dBm   | -46                                                       |
| $P_{\text{Interferer 2 (Modulated)}}$                                                                                                                                                                                                                                                                                                                                               | dBm   | -46                                                       |
| $BW_{\text{Interferer 2}}$                                                                                                                                                                                                                                                                                                                                                          | MHz   | 20                                                        |
| $F_{\text{Interferer 1 (Offset)}}$                                                                                                                                                                                                                                                                                                                                                  | MHz   | $-BW/2 - 30 / +BW/2 + 30$                                 |
| $F_{\text{Interferer 2 (Offset)}}$                                                                                                                                                                                                                                                                                                                                                  | MHz   | $2 \cdot F_{\text{Interferer 1}}$                         |
| NOTE 1: The transmitter shall be set to 4dB below $P_{\text{CMAX\_L,f,c}}$ at the minimum UL configuration specified in Table 7.3F.2-3 with $P_{\text{CMAX\_L,f,c}}$ defined in clause 6.2.4.                                                                                                                                                                                       |       |                                                           |
| NOTE 2: Reference measurement channel is specified in Annexes A.2.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).                                                                                                                                                                                   |       |                                                           |
| NOTE 3: The modulated interferer consists of the Reference measurement channel specified in Annexes A.3.2.2 and A.3.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1 and the same SCS as the wanted signal.                                                                                                             |       |                                                           |
| NOTE 4: The $F_{\text{Interferer 1 (offset)}}$ is the frequency separation of the center frequency of the carrier closest to the interferer and the center frequency of the CW interferer and $F_{\text{Interferer 2 (offset)}}$ is the frequency separation of the center frequency of the carrier closest to the interferer and the center frequency of the modulated interferer. |       |                                                           |

## 7.9 Spurious emissions

The spurious emissions power is the power of emissions generated or amplified in a receiver that appear at the UE antenna connector.

The power of any narrow band CW spurious emission shall not exceed the maximum level specified in Table 7.9-1.

**Table 7.9-1: General receiver spurious emission requirements**

| Frequency range                               | Measurement bandwidth | Maximum level | NOTE |
|-----------------------------------------------|-----------------------|---------------|------|
| $30 \text{ MHz} \leq f < 1 \text{ GHz}$       | 100 kHz               | -57 dBm       |      |
| $1 \text{ GHz} \leq f \leq 12.75 \text{ GHz}$ | 1 MHz                 | -47 dBm       |      |

|                                                                                                                                   |       |         |   |
|-----------------------------------------------------------------------------------------------------------------------------------|-------|---------|---|
| 12.75 GHz ≤ f ≤ 5 <sup>th</sup> harmonic of the upper frequency edge of the DL operating band in GHz                              | 1 MHz | -47 dBm | 2 |
| 12.75 GHz – 26 GHz                                                                                                                | 1 MHz | -47 dBm | 3 |
| NOTE 1: Unused PDCCH resources are padded with resource element groups with power level given by PDCCH as defined in Annex C.3.1. |       |         |   |
| NOTE 2: Applies for Band that the upper frequency edge of the DL Band more than 2.69 GHz.                                         |       |         |   |
| NOTE 3: Applies for Band that the upper frequency edge of the DL Band more than 5.2 GHz.                                          |       |         |   |

7.9A Spurious emissions for CA

7.9A.1 Void

7.9A.2 Void

7.9A.3 Spurious emissions for Inter-band CA

For inter-band carrier aggregation including an operating band without uplink band, the UE shall meet the Rx spurious emissions requirements specified in clause 7.9 for each component carrier while all downlink carriers are active.

7.9B Spurious emissions for NR-DC

For inter-band NR-DC configurations, the spurious emissions for the corresponding inter-band CA configuration as specified in clause 7.9A applies.



# Annex A (normative): Measurement channels

## A.1 General

The throughput values defined in the measurement channels specified in Annex A, are calculated and are valid per datastream (codeword). For multi-stream (more than one codeword) transmissions, the throughput referenced in the minimum requirements is the sum of throughputs of all datastreams (codewords).

The UE category entry in the definition of the reference measurement channel in Annex A is only informative and reveals the UE categories, which can support the corresponding measurement channel. Whether the measurement channel is used for testing a certain UE category or not is specified in the individual minimum requirements.

## A.2 UL reference measurement channels

### A.2.1 General

The measurement channels in the following clauses are defined to derive the requirements in clause 6 (Transmitter Characteristics) and clause 7 (Receiver Characteristics). The measurement channels represent example configurations of physical channels for different data rates.

The measurement channels in the following clauses are applicable to both FDD and TDD.

The active uplink slots for TDD configurations are specified in table A.2.1-1. TDD slot patterns defined for reference sensitivity tests will be used for TDD UL RMCs, unless otherwise stated. The active uplink slots for additional TDD configuration specified in Table A.2.1-2, with the TDD pattern defined in Table A.2.1-3, is used for the phase continuity tests for DMRS bundling with 15 kHz SCS. The active uplink slots configuration specified in Table A.2.1-4 and the additional TDD pattern in Table A.2.1-5 are used for shorter transient period capability EVM tests at 15 kHz SCS.

**Table A.2.1-1: TDD active uplink slots**

| SCS    | Active Uplink slots            |
|--------|--------------------------------|
| 15 kHz | 4, 9                           |
| 30 kHz | 8, 9, 18, 19                   |
| 60 kHz | 16, 17, 18, 19, 36, 37, 38, 39 |

**Table A.2.1-2: TDD active uplink slots for additional TDD configuration**

| SCS    | Active Uplink slots |
|--------|---------------------|
| 15 kHz | 8, 9                |

**Table A.2.1-3: TDD pattern for additional TDD configuration**

| Parameter                               |                               | Value                 |
|-----------------------------------------|-------------------------------|-----------------------|
|                                         |                               | SCS 15 kHz ( $\mu$ 0) |
| TDD Slot Configuration pattern (Note 1) |                               | 7DS2U                 |
| Special Slot Configuration (Note 2)     |                               | 6D+4G+4U              |
| referenceSubcarrierSpacing              |                               | 15 kHz                |
| UL-DL configuration                     | dl-UL-TransmissionPeriodicity | 10 ms                 |

|                                                                                                                                                                            |                            |   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|---|
|                                                                                                                                                                            | <i>nrofDownlinkSlots</i>   | 7 |
|                                                                                                                                                                            | <i>nrofDownlinkSymbols</i> | 6 |
|                                                                                                                                                                            | <i>nrofUplinkSlot</i>      | 2 |
|                                                                                                                                                                            | <i>nrofUplinkSymbols</i>   | 4 |
| NOTE 1: D denotes a slot with all DL symbols; S denotes a slot with a mix of DL, UL and guard symbols; U denotes a slot with all UL symbols. The field is for information. |                            |   |
| NOTE 2: D, G, U denote DL, guard and UL symbols, respectively. The field is for information.                                                                               |                            |   |

Table A.2.1-4: TDD active uplink slots for shorter transient period capability

| SCS    | Active Uplink slots |
|--------|---------------------|
| 15 kHz | 3,4                 |

Table A.2.1-5: Additional TDD pattern for shorter transient period capability

| Parameter                                                                                                                                                                  |                                      | Value           |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-----------------|
|                                                                                                                                                                            |                                      | SCS 15 kHz (μ0) |
| TDD Slot Configuration pattern (Note 1)                                                                                                                                    |                                      | 2DS2U           |
| Special Slot Configuration (Note 2)                                                                                                                                        |                                      | 10D+2G+2U       |
| referenceSubcarrierSpacing                                                                                                                                                 |                                      | 15 kHz          |
| UL-DL configuration                                                                                                                                                        | <i>dl-UL-TransmissionPeriodicity</i> | 5 ms            |
|                                                                                                                                                                            | <i>nrofDownlinkSlots</i>             | 2               |
|                                                                                                                                                                            | <i>nrofDownlinkSymbols</i>           | 10              |
|                                                                                                                                                                            | <i>nrofUplinkSlot</i>                | 2               |
|                                                                                                                                                                            | <i>nrofUplinkSymbols</i>             | 2               |
| NOTE 1: D denotes a slot with all DL symbols; S denotes a slot with a mix of DL, UL and guard symbols; U denotes a slot with all UL symbols. The field is for information. |                                      |                 |
| NOTE 2: D, G, U denote DL, guard and UL symbols, respectively. The field is for information.                                                                               |                                      |                 |



## A.2.2 Reference measurement channels

### A.2.2.1 DFT-s-OFDM Pi/2-BPSK

Table A.2.2.1-1: Reference Channels for DFT-s-OFDM Pi/2-BPSK

| Parameter                                                                                                                                                                                                                              | Allocated resource blocks (L <sub>CRB</sub> ) | DFT-s-OFDM Symbols per slot (Note 1) | Modulation | MCS Index (Note 2) | Payload size | Transport block CRC | LDPC Base Graph | Number of code blocks per slot (Note 3) | Total number of bits per slot | Total modulated symbols per slot |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|--------------------------------------|------------|--------------------|--------------|---------------------|-----------------|-----------------------------------------|-------------------------------|----------------------------------|
| Unit                                                                                                                                                                                                                                   |                                               |                                      |            |                    | Bits         | Bits                |                 |                                         | Bits                          |                                  |
|                                                                                                                                                                                                                                        | 1                                             | 11                                   | pi/2 BPSK  | 0                  | 24           | 16                  | 2               | 1                                       | 132                           | 132                              |
|                                                                                                                                                                                                                                        | 5                                             | 11                                   | pi/2 BPSK  | 0                  | 160          | 16                  | 2               | 1                                       | 660                           | 660                              |
|                                                                                                                                                                                                                                        | 9                                             | 11                                   | pi/2 BPSK  | 0                  | 288          | 16                  | 2               | 1                                       | 1188                          | 1188                             |
|                                                                                                                                                                                                                                        | 10                                            | 11                                   | pi/2 BPSK  | 0                  | 320          | 16                  | 2               | 1                                       | 1320                          | 1320                             |
|                                                                                                                                                                                                                                        | 12                                            | 11                                   | pi/2 BPSK  | 0                  | 384          | 16                  | 2               | 1                                       | 1584                          | 1584                             |
|                                                                                                                                                                                                                                        | 15                                            | 11                                   | pi/2 BPSK  | 0                  | 480          | 16                  | 2               | 1                                       | 1980                          | 1980                             |
|                                                                                                                                                                                                                                        | 18                                            | 11                                   | pi/2 BPSK  | 0                  | 576          | 16                  | 2               | 1                                       | 2376                          | 2376                             |
|                                                                                                                                                                                                                                        | 24                                            | 11                                   | pi/2 BPSK  | 0                  | 768          | 16                  | 2               | 1                                       | 3168                          | 3168                             |
|                                                                                                                                                                                                                                        | 25                                            | 11                                   | pi/2 BPSK  | 0                  | 808          | 16                  | 2               | 1                                       | 3300                          | 3300                             |
|                                                                                                                                                                                                                                        | 30                                            | 11                                   | pi/2 BPSK  | 0                  | 984          | 16                  | 2               | 1                                       | 3960                          | 3960                             |
|                                                                                                                                                                                                                                        | 32                                            | 11                                   | pi/2 BPSK  | 0                  | 1032         | 16                  | 2               | 1                                       | 4224                          | 4224                             |
|                                                                                                                                                                                                                                        | 36                                            | 11                                   | pi/2 BPSK  | 0                  | 1128         | 16                  | 2               | 1                                       | 4752                          | 4752                             |
|                                                                                                                                                                                                                                        | 45                                            | 11                                   | pi/2 BPSK  | 0                  | 1416         | 16                  | 2               | 1                                       | 5940                          | 5940                             |
|                                                                                                                                                                                                                                        | 50                                            | 11                                   | pi/2 BPSK  | 0                  | 1544         | 16                  | 2               | 1                                       | 6600                          | 6600                             |
|                                                                                                                                                                                                                                        | 60                                            | 11                                   | pi/2 BPSK  | 0                  | 1864         | 16                  | 2               | 1                                       | 7920                          | 7920                             |
|                                                                                                                                                                                                                                        | 64                                            | 11                                   | pi/2 BPSK  | 0                  | 2024         | 16                  | 2               | 1                                       | 8448                          | 8448                             |
|                                                                                                                                                                                                                                        | 75                                            | 11                                   | pi/2 BPSK  | 0                  | 2408         | 16                  | 2               | 1                                       | 9900                          | 9900                             |
|                                                                                                                                                                                                                                        | 80                                            | 11                                   | pi/2 BPSK  | 0                  | 2472         | 16                  | 2               | 1                                       | 10560                         | 10560                            |
|                                                                                                                                                                                                                                        | 81                                            | 11                                   | pi/2 BPSK  | 0                  | 2536         | 16                  | 2               | 1                                       | 10692                         | 10692                            |
|                                                                                                                                                                                                                                        | 90                                            | 11                                   | pi/2 BPSK  | 0                  | 2792         | 16                  | 2               | 1                                       | 11880                         | 11880                            |
|                                                                                                                                                                                                                                        | 100                                           | 11                                   | pi/2 BPSK  | 0                  | 3104         | 16                  | 2               | 1                                       | 13200                         | 13200                            |
|                                                                                                                                                                                                                                        | 108                                           | 11                                   | pi/2 BPSK  | 0                  | 3368         | 16                  | 2               | 1                                       | 14256                         | 14256                            |
|                                                                                                                                                                                                                                        | 120                                           | 11                                   | pi/2 BPSK  | 0                  | 3752         | 16                  | 2               | 1                                       | 15840                         | 15840                            |
|                                                                                                                                                                                                                                        | 128                                           | 11                                   | pi/2 BPSK  | 0                  | 3976         | 24                  | 2               | 2                                       | 16896                         | 16896                            |
|                                                                                                                                                                                                                                        | 135                                           | 11                                   | pi/2 BPSK  | 0                  | 4104         | 24                  | 2               | 2                                       | 17820                         | 17820                            |
|                                                                                                                                                                                                                                        | 160                                           | 11                                   | pi/2 BPSK  | 0                  | 4872         | 24                  | 2               | 2                                       | 21120                         | 21120                            |
|                                                                                                                                                                                                                                        | 162                                           | 11                                   | pi/2 BPSK  | 0                  | 5000         | 24                  | 2               | 2                                       | 21384                         | 21384                            |
|                                                                                                                                                                                                                                        | 180                                           | 11                                   | pi/2 BPSK  | 0                  | 5512         | 24                  | 2               | 2                                       | 23760                         | 23760                            |
|                                                                                                                                                                                                                                        | 216                                           | 11                                   | pi/2 BPSK  | 0                  | 6664         | 24                  | 2               | 2                                       | 28512                         | 28512                            |
|                                                                                                                                                                                                                                        | 243                                           | 11                                   | pi/2 BPSK  | 0                  | 7560         | 24                  | 2               | 2                                       | 32076                         | 32076                            |
|                                                                                                                                                                                                                                        | 270                                           | 11                                   | pi/2 BPSK  | 0                  | 8448         | 24                  | 2               | 3                                       | 35640                         | 35640                            |
| NOTE 1: PUSCH mapping Type-A and single-symbol DM-RS configuration Type-1 with 2 additional DM-RS symbols, such that the DM-RS positions are set to symbols 2, 7, 11. DMRS is [TDM'ed] with PUSCH data. DM-RS symbols are not counted. |                                               |                                      |            |                    |              |                     |                 |                                         |                               |                                  |
| NOTE 2: MCS Index is based on MCS Table 6.1.4.1-1 defined in TS 38.214 [10].                                                                                                                                                           |                                               |                                      |            |                    |              |                     |                 |                                         |                               |                                  |
| NOTE 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).                                                                                        |                                               |                                      |            |                    |              |                     |                 |                                         |                               |                                  |
| NOTE 4: The RMCs apply to all channel bandwidth where L <sub>CRB</sub> ≤ N <sub>RB</sub> .                                                                                                                                             |                                               |                                      |            |                    |              |                     |                 |                                         |                               |                                  |

Table A.2.2.1-2: Void

Table A.2.2.1-3: Void

## A.2.2.2 DFT-s-OFDM QPSK

Table A.2.2.2-1: Reference Channels for DFT-s-OFDM QPSK for

| Parameter | Allocated resource blocks ( $L_{CRB}$ ) | DFT-s-OFDM Symbols per slot (Note 1) | Modulation | MCS Index (Note 2) | Payload size | Transport block CRC | LDPC Base Graph | Number of code blocks per slot (Note 3) | Total number of bits per slot | Total modulated symbols per slot |
|-----------|-----------------------------------------|--------------------------------------|------------|--------------------|--------------|---------------------|-----------------|-----------------------------------------|-------------------------------|----------------------------------|
| Unit      |                                         |                                      |            |                    | Bits         | Bits                |                 |                                         | Bits                          |                                  |
|           | 1                                       | 11                                   | QPSK       | 2                  | 48           | 16                  | 2               | 1                                       | 264                           | 132                              |
|           | 5                                       | 11                                   | QPSK       | 2                  | 256          | 16                  | 2               | 1                                       | 1320                          | 660                              |
|           | 9                                       | 11                                   | QPSK       | 2                  | 456          | 16                  | 2               | 1                                       | 2376                          | 1188                             |
|           | 10                                      | 11                                   | QPSK       | 2                  | 504          | 16                  | 2               | 1                                       | 2640                          | 1320                             |
|           | 12                                      | 11                                   | QPSK       | 2                  | 608          | 16                  | 2               | 1                                       | 3168                          | 1584                             |
|           | 15                                      | 11                                   | QPSK       | 2                  | 768          | 16                  | 2               | 1                                       | 3960                          | 1980                             |
|           | 18                                      | 11                                   | QPSK       | 2                  | 928          | 16                  | 2               | 1                                       | 4752                          | 2376                             |
|           | 20                                      | 11                                   | QPSK       | 2                  | 1032         | 16                  | 2               | 1                                       | 5280                          | 2640                             |
|           | 24                                      | 11                                   | QPSK       | 2                  | 1192         | 16                  | 2               | 1                                       | 6336                          | 3168                             |
|           | 25                                      | 11                                   | QPSK       | 2                  | 1256         | 16                  | 2               | 1                                       | 6600                          | 3300                             |
|           | 30                                      | 11                                   | QPSK       | 2                  | 1544         | 16                  | 2               | 1                                       | 7920                          | 3960                             |
|           | 32                                      | 11                                   | QPSK       | 2                  | 1608         | 16                  | 2               | 1                                       | 8448                          | 4224                             |
|           | 36                                      | 11                                   | QPSK       | 2                  | 1800         | 16                  | 2               | 1                                       | 9504                          | 4752                             |
|           | 45                                      | 11                                   | QPKS       | 2                  | 2208         | 16                  | 2               | 1                                       | 11880                         | 5940                             |
|           | 50                                      | 11                                   | QPSK       | 2                  | 2472         | 16                  | 2               | 1                                       | 13200                         | 6600                             |
|           | 60                                      | 11                                   | QPSK       | 2                  | 3104         | 16                  | 2               | 1                                       | 15840                         | 7920                             |
|           | 64                                      | 11                                   | QPSK       | 2                  | 3240         | 16                  | 2               | 1                                       | 16896                         | 8448                             |
|           | 75                                      | 11                                   | QPSK       | 2                  | 3752         | 16                  | 2               | 1                                       | 19800                         | 9900                             |
|           | 80                                      | 11                                   | QPSK       | 2                  | 3976         | 24                  | 2               | 2                                       | 21120                         | 10560                            |
|           | 81                                      | 11                                   | QPSK       | 2                  | 4040         | 24                  | 2               | 2                                       | 21384                         | 10692                            |
|           | 90                                      | 11                                   | QPSK       | 2                  | 4488         | 24                  | 2               | 2                                       | 23760                         | 11880                            |
|           | 100                                     | 11                                   | QPSK       | 2                  | 5000         | 24                  | 2               | 2                                       | 26400                         | 13200                            |
|           | 108                                     | 11                                   | QPSK       | 2                  | 5384         | 24                  | 2               | 2                                       | 28512                         | 14256                            |
|           | 120                                     | 11                                   | QPSK       | 2                  | 5896         | 24                  | 2               | 2                                       | 31680                         | 15840                            |
|           | 128                                     | 11                                   | QPSK       | 2                  | 6408         | 24                  | 2               | 2                                       | 33792                         | 16896                            |
|           | 135                                     | 11                                   | QPSK       | 2                  | 6664         | 24                  | 2               | 2                                       | 35640                         | 17820                            |
|           | 160                                     | 11                                   | QPSK       | 2                  | 7944         | 24                  | 2               | 3                                       | 42240                         | 21120                            |
|           | 162                                     | 11                                   | QPSK       | 2                  | 8064         | 24                  | 2               | 3                                       | 42768                         | 21384                            |
|           | 180                                     | 11                                   | QPSK       | 2                  | 8976         | 24                  | 2               | 3                                       | 47520                         | 23760                            |
|           | 216                                     | 11                                   | QPSK       | 2                  | 10752        | 24                  | 2               | 3                                       | 57024                         | 28512                            |
|           | 243                                     | 11                                   | QPSK       | 2                  | 12040        | 24                  | 2               | 4                                       | 64152                         | 32076                            |
|           | 270                                     | 11                                   | QPSK       | 2                  | 13320        | 24                  | 2               | 4                                       | 71280                         | 35640                            |

NOTE 1: PUSCH mapping Type-A and single-symbol DM-RS configuration Type-1 with 2 additional DM-RS symbols, such that the DM-RS positions are set to symbols 2, 7, 11. DMRS is [TDM'ed] with PUSCH data. DM-RS symbols are not counted.

NOTE 2: MCS Index is based on MCS Table 6.1.4.1-1 defined in TS 38.214 [10].

NOTE 3: If more than one Code Block is present, an additional CRC sequence of  $L = 24$  Bits is attached to each Code Block (otherwise  $L = 0$  Bit).

NOTE 4: The RMCs apply to all channel bandwidth where  $L_{CRB} \leq N_{RB}$ .

Table A.2.2.2-2: Void

Table A.2.2.2-3: Void

## A.2.2.3 DFT-s-OFDM 16QAM

Table A.2.2.3-1: Reference Channels for DFT-s-OFDM 16QAM

| Parameter | Allocated resource | DFT-s-OFDM Symbols | Modulation | MCS Index (Note 2) | Payload size | Transport block CRC | LDPC Base Graph | Number of code blocks | Total number | Total modulated |
|-----------|--------------------|--------------------|------------|--------------------|--------------|---------------------|-----------------|-----------------------|--------------|-----------------|
|-----------|--------------------|--------------------|------------|--------------------|--------------|---------------------|-----------------|-----------------------|--------------|-----------------|

|                                                                                                                                                                                                                                        | blocks<br>( $L_{CRB}$ ) | per slot<br>(Note 1) |       |    |       |      |   | per slot<br>(Note 3) | of bits<br>per slot | symbols<br>per slot |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|----------------------|-------|----|-------|------|---|----------------------|---------------------|---------------------|
| Unit                                                                                                                                                                                                                                   |                         |                      |       |    | Bits  | Bits |   |                      | Bits                |                     |
|                                                                                                                                                                                                                                        | 1                       | 11                   | 16QAM | 10 | 176   | 16   | 2 | 1                    | 528                 | 132                 |
|                                                                                                                                                                                                                                        | 5                       | 11                   | 16QAM | 10 | 888   | 16   | 2 | 1                    | 2640                | 660                 |
|                                                                                                                                                                                                                                        | 9                       | 11                   | 16QAM | 10 | 1608  | 16   | 2 | 1                    | 4752                | 1188                |
|                                                                                                                                                                                                                                        | 10                      | 11                   | 16QAM | 10 | 1800  | 16   | 2 | 1                    | 5280                | 1320                |
|                                                                                                                                                                                                                                        | 12                      | 11                   | 16QAM | 10 | 2088  | 16   | 2 | 1                    | 6336                | 1584                |
|                                                                                                                                                                                                                                        | 15                      | 11                   | 16QAM | 10 | 2664  | 16   | 2 | 1                    | 7920                | 1980                |
|                                                                                                                                                                                                                                        | 18                      | 11                   | 16QAM | 10 | 3240  | 16   | 2 | 1                    | 9504                | 2376                |
|                                                                                                                                                                                                                                        | 24                      | 11                   | 16QAM | 10 | 4224  | 24   | 1 | 1                    | 12672               | 3168                |
|                                                                                                                                                                                                                                        | 25                      | 11                   | 16QAM | 10 | 4352  | 24   | 1 | 1                    | 13200               | 3300                |
|                                                                                                                                                                                                                                        | 30                      | 11                   | 16QAM | 10 | 5248  | 24   | 1 | 1                    | 15840               | 3960                |
|                                                                                                                                                                                                                                        | 32                      | 11                   | 16QAM | 10 | 5632  | 24   | 1 | 1                    | 16896               | 4224                |
|                                                                                                                                                                                                                                        | 36                      | 11                   | 16QAM | 10 | 6272  | 24   | 1 | 1                    | 19008               | 4752                |
|                                                                                                                                                                                                                                        | 45                      | 11                   | 16QAM | 10 | 7808  | 24   | 1 | 1                    | 23760               | 5940                |
|                                                                                                                                                                                                                                        | 50                      | 11                   | 16QAM | 10 | 8712  | 24   | 1 | 2                    | 26400               | 6600                |
|                                                                                                                                                                                                                                        | 60                      | 11                   | 16QAM | 10 | 10504 | 24   | 1 | 2                    | 31680               | 7920                |
|                                                                                                                                                                                                                                        | 64                      | 11                   | 16QAM | 10 | 11272 | 24   | 1 | 2                    | 33792               | 8448                |
|                                                                                                                                                                                                                                        | 75                      | 11                   | 16QAM | 10 | 13064 | 24   | 1 | 2                    | 39600               | 9900                |
|                                                                                                                                                                                                                                        | 80                      | 11                   | 16QAM | 10 | 14088 | 24   | 1 | 2                    | 42240               | 10560               |
|                                                                                                                                                                                                                                        | 81                      | 11                   | 16QAM | 10 | 14088 | 24   | 1 | 2                    | 42768               | 10692               |
|                                                                                                                                                                                                                                        | 100                     | 11                   | 16QAM | 10 | 17424 | 24   | 1 | 3                    | 52800               | 13200               |
|                                                                                                                                                                                                                                        | 108                     | 11                   | 16QAM | 10 | 18960 | 24   | 1 | 3                    | 57024               | 14256               |
|                                                                                                                                                                                                                                        | 120                     | 11                   | 16QAM | 10 | 21000 | 24   | 1 | 3                    | 63360               | 15840               |
|                                                                                                                                                                                                                                        | 128                     | 11                   | 16QAM | 10 | 22536 | 24   | 1 | 3                    | 67584               | 16896               |
|                                                                                                                                                                                                                                        | 135                     | 11                   | 16QAM | 10 | 23568 | 24   | 1 | 3                    | 71280               | 17820               |
|                                                                                                                                                                                                                                        | 160                     | 11                   | 16QAM | 10 | 28168 | 24   | 1 | 4                    | 84480               | 21120               |
|                                                                                                                                                                                                                                        | 162                     | 11                   | 16QAM | 10 | 28168 | 24   | 1 | 4                    | 85536               | 21384               |
|                                                                                                                                                                                                                                        | 216                     | 11                   | 16QAM | 10 | 37896 | 24   | 1 | 5                    | 114048              | 28512               |
|                                                                                                                                                                                                                                        | 243                     | 11                   | 16QAM | 10 | 43032 | 24   | 1 | 6                    | 128304              | 32076               |
|                                                                                                                                                                                                                                        | 270                     | 11                   | 16QAM | 10 | 47112 | 24   | 1 | 6                    | 142560              | 35640               |
| NOTE 1: PUSCH mapping Type-A and single-symbol DM-RS configuration Type-1 with 2 additional DM-RS symbols, such that the DM-RS positions are set to symbols 2, 7, 11. DMRS is [TDM'ed] with PUSCH data. DM-RS symbols are not counted. |                         |                      |       |    |       |      |   |                      |                     |                     |
| NOTE 2: MCS Index is based on MCS Table 6.1.4.1-1 defined in TS 38.214 [10].                                                                                                                                                           |                         |                      |       |    |       |      |   |                      |                     |                     |
| NOTE 3: If more than one Code Block is present, an additional CRC sequence of $L = 24$ Bits is attached to each Code Block (otherwise $L = 0$ Bit).                                                                                    |                         |                      |       |    |       |      |   |                      |                     |                     |
| NOTE 4: The RMCs apply to all channel bandwidth where $L_{CRB} \leq N_{RB}$ .                                                                                                                                                          |                         |                      |       |    |       |      |   |                      |                     |                     |

Table A.2.2.3-2: Void

Table A.2.2.3-3: Void

## A.2.2.4 DFT-s-OFDM 64QAM

Table A.2.2.4-1: Reference Channels for DFT-s-OFDM 64QAM

| Parameter | Allocated resource blocks (L <sub>CRB</sub> ) | DFT-s-OFDM Symbols per slot (Note 1) | Modulation | MCS Index (Note 2) | Payload size | Transport block CRC | LDPC Base Graph | Number of code blocks per slot (Note 3) | Total number of bits per slot | Total modulated symbols per slot |
|-----------|-----------------------------------------------|--------------------------------------|------------|--------------------|--------------|---------------------|-----------------|-----------------------------------------|-------------------------------|----------------------------------|
| Unit      |                                               |                                      |            |                    | Bits         | Bits                |                 |                                         | Bits                          |                                  |
|           | 1                                             | 11                                   | 64QAM      | 18                 | 408          | 16                  | 2               | 1                                       | 792                           | 132                              |
|           | 5                                             | 11                                   | 64QAM      | 18                 | 2024         | 16                  | 2               | 1                                       | 3960                          | 660                              |
|           | 9                                             | 11                                   | 64QAM      | 18                 | 3624         | 16                  | 2               | 1                                       | 7128                          | 1188                             |
|           | 10                                            | 11                                   | 64QAM      | 18                 | 3968         | 24                  | 1               | 1                                       | 7920                          | 1320                             |
|           | 12                                            | 11                                   | 64QAM      | 18                 | 4736         | 24                  | 1               | 1                                       | 9504                          | 1584                             |
|           | 15                                            | 11                                   | 64QAM      | 18                 | 6016         | 24                  | 1               | 1                                       | 11880                         | 1980                             |
|           | 18                                            | 11                                   | 64QAM      | 18                 | 7168         | 24                  | 1               | 1                                       | 14256                         | 2376                             |
|           | 24                                            | 11                                   | 64QAM      | 18                 | 9480         | 24                  | 1               | 2                                       | 19008                         | 3168                             |
|           | 25                                            | 11                                   | 64QAM      | 18                 | 9992         | 24                  | 1               | 2                                       | 19800                         | 3300                             |
|           | 30                                            | 11                                   | 64QAM      | 18                 | 12040        | 24                  | 1               | 2                                       | 23760                         | 3960                             |
|           | 32                                            | 11                                   | 64QAM      | 18                 | 12808        | 24                  | 1               | 2                                       | 25344                         | 4224                             |
|           | 36                                            | 11                                   | 64QAM      | 18                 | 14344        | 24                  | 1               | 2                                       | 28512                         | 4752                             |
|           | 45                                            | 11                                   | 64QAM      | 18                 | 17928        | 24                  | 1               | 3                                       | 35640                         | 5940                             |
|           | 50                                            | 11                                   | 64QAM      | 18                 | 19968        | 24                  | 1               | 3                                       | 39600                         | 6600                             |
|           | 60                                            | 11                                   | 64QAM      | 18                 | 24072        | 24                  | 1               | 3                                       | 47520                         | 7920                             |
|           | 64                                            | 11                                   | 64QAM      | 18                 | 25608        | 24                  | 1               | 4                                       | 50688                         | 8448                             |
|           | 75                                            | 11                                   | 64QAM      | 18                 | 30216        | 24                  | 1               | 4                                       | 59400                         | 9900                             |
|           | 80                                            | 11                                   | 64QAM      | 18                 | 31752        | 24                  | 1               | 4                                       | 63360                         | 10560                            |
|           | 81                                            | 11                                   | 64QAM      | 18                 | 32264        | 24                  | 1               | 4                                       | 64152                         | 10692                            |
|           | 90                                            | 11                                   | 64QAM      | 18                 | 35856        | 24                  | 1               | 5                                       | 71280                         | 11880                            |
|           | 100                                           | 11                                   | 64QAM      | 18                 | 39936        | 24                  | 1               | 5                                       | 79200                         | 13200                            |
|           | 108                                           | 11                                   | 64QAM      | 18                 | 43032        | 24                  | 1               | 6                                       | 85536                         | 14256                            |
|           | 120                                           | 11                                   | 64QAM      | 18                 | 48168        | 24                  | 1               | 6                                       | 95040                         | 15840                            |
|           | 128                                           | 11                                   | 64QAM      | 18                 | 51216        | 24                  | 1               | 7                                       | 101376                        | 16896                            |
|           | 135                                           | 11                                   | 64QAM      | 18                 | 54296        | 24                  | 1               | 7                                       | 106920                        | 17820                            |
|           | 160                                           | 11                                   | 64QAM      | 18                 | 63528        | 24                  | 1               | 8                                       | 126720                        | 21120                            |
|           | 162                                           | 11                                   | 64QAM      | 18                 | 64552        | 24                  | 1               | 8                                       | 128304                        | 21384                            |
|           | 180                                           | 11                                   | 64QAM      | 18                 | 71688        | 24                  | 1               | 9                                       | 142560                        | 23760                            |
|           | 216                                           | 11                                   | 64QAM      | 18                 | 86040        | 24                  | 1               | 11                                      | 171072                        | 28512                            |
|           | 243                                           | 11                                   | 64QAM      | 18                 | 96264        | 24                  | 1               | 12                                      | 192456                        | 32076                            |
|           | 270                                           | 11                                   | 64QAM      | 18                 | 108552       | 24                  | 1               | 13                                      | 213840                        | 35640                            |

NOTE 1: PUSCH mapping Type-A and single-symbol DM-RS configuration Type-1 with 2 additional DM-RS symbols, such that the DM-RS positions are set to symbols 2, 7, 11. DMRS is [TDM'ed] with PUSCH data. DM-RS symbols are not counted.

NOTE 2: MCS Index is based on MCS Table 6.1.4.1-1 defined in TS 38.214 [10].

NOTE 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).

NOTE 4: The RMCs apply to all channel bandwidth where  $L_{CRB} \leq N_{RB}$ .

Table A.2.2.4-2: Void

Table A.2.2.4-3: Void

## A.2.2.5 DFT-s-OFDM 256QAM

Table A.2.2.5-1: Reference Channels for DFT-s-OFDM 256QAM

| Parameter | Allocated resource blocks (L <sub>CRB</sub> ) | DFT-s-OFDM Symbols per slot (Note 1) | Modulation | MCS Index (Note 2) | Payload size | Transport block CRC | LDPC Base Graph | Number of code blocks per slot (Note 3) | Total number of bits per slot | Total modulated symbols per slot |
|-----------|-----------------------------------------------|--------------------------------------|------------|--------------------|--------------|---------------------|-----------------|-----------------------------------------|-------------------------------|----------------------------------|
| Unit      |                                               |                                      |            |                    | Bits         | Bits                |                 |                                         | Bits                          |                                  |
|           | 1                                             | 11                                   | 256QAM     | 20                 | 704          | 16                  | 2               | 1                                       | 1056                          | 132                              |
|           | 5                                             | 11                                   | 256QAM     | 20                 | 3496         | 16                  | 2               | 1                                       | 5280                          | 660                              |
|           | 9                                             | 11                                   | 256QAM     | 20                 | 6272         | 24                  | 1               | 1                                       | 9504                          | 1188                             |
|           | 10                                            | 11                                   | 256QAM     | 20                 | 7040         | 24                  | 1               | 1                                       | 10560                         | 1320                             |
|           | 12                                            | 11                                   | 256QAM     | 20                 | 8456         | 24                  | 1               | 2                                       | 12672                         | 1584                             |
|           | 15                                            | 11                                   | 256QAM     | 20                 | 10504        | 24                  | 1               | 2                                       | 15840                         | 1980                             |
|           | 18                                            | 11                                   | 256QAM     | 20                 | 12552        | 24                  | 1               | 2                                       | 19008                         | 2376                             |
|           | 24                                            | 11                                   | 256QAM     | 20                 | 16896        | 24                  | 1               | 3                                       | 25344                         | 3168                             |
|           | 25                                            | 11                                   | 256QAM     | 20                 | 17424        | 24                  | 1               | 3                                       | 26400                         | 3300                             |
|           | 30                                            | 11                                   | 256QAM     | 20                 | 21000        | 24                  | 1               | 3                                       | 31680                         | 3960                             |
|           | 32                                            | 11                                   | 256QAM     | 20                 | 22536        | 24                  | 1               | 3                                       | 33792                         | 4224                             |
|           | 36                                            | 11                                   | 256QAM     | 20                 | 25104        | 24                  | 1               | 3                                       | 38016                         | 4752                             |
|           | 45                                            | 11                                   | 256QAM     | 20                 | 31752        | 24                  | 1               | 4                                       | 47520                         | 5940                             |
|           | 50                                            | 11                                   | 256QAM     | 20                 | 34816        | 24                  | 1               | 5                                       | 52800                         | 6600                             |
|           | 60                                            | 11                                   | 256QAM     | 20                 | 42016        | 24                  | 1               | 5                                       | 63360                         | 7920                             |
|           | 64                                            | 11                                   | 256QAM     | 20                 | 45096        | 24                  | 1               | 6                                       | 67584                         | 8448                             |
|           | 75                                            | 11                                   | 256QAM     | 20                 | 53288        | 24                  | 1               | 7                                       | 79200                         | 9900                             |
|           | 80                                            | 11                                   | 256QAM     | 20                 | 56368        | 24                  | 1               | 7                                       | 84480                         | 10560                            |
|           | 81                                            | 11                                   | 256QAM     | 20                 | 57376        | 24                  | 1               | 7                                       | 85536                         | 10692                            |
|           | 90                                            | 11                                   | 256QAM     | 20                 | 63528        | 24                  | 1               | 8                                       | 95040                         | 11880                            |
|           | 100                                           | 11                                   | 256QAM     | 20                 | 69672        | 24                  | 1               | 9                                       | 105600                        | 13200                            |
|           | 108                                           | 11                                   | 256QAM     | 20                 | 75792        | 24                  | 1               | 9                                       | 114048                        | 14256                            |
|           | 120                                           | 11                                   | 256QAM     | 20                 | 83976        | 24                  | 1               | 10                                      | 126720                        | 15840                            |
|           | 128                                           | 11                                   | 256QAM     | 20                 | 90176        | 24                  | 1               | 11                                      | 135168                        | 16896                            |
|           | 135                                           | 11                                   | 256QAM     | 20                 | 94248        | 24                  | 1               | 12                                      | 142560                        | 17820                            |
|           | 160                                           | 11                                   | 256QAM     | 20                 | 112648       | 24                  | 1               | 14                                      | 168960                        | 21120                            |
|           | 162                                           | 11                                   | 256QAM     | 20                 | 114776       | 24                  | 1               | 14                                      | 171072                        | 21384                            |
|           | 180                                           | 11                                   | 256QAM     | 20                 | 127080       | 24                  | 1               | 16                                      | 190080                        | 23760                            |
|           | 216                                           | 11                                   | 256QAM     | 20                 | 151608       | 24                  | 1               | 18                                      | 228096                        | 28512                            |
|           | 243                                           | 11                                   | 256QAM     | 20                 | 172176       | 24                  | 1               | 21                                      | 256608                        | 32076                            |
|           | 270                                           | 11                                   | 256QAM     | 20                 | 188576       | 24                  | 1               | 23                                      | 285120                        | 35640                            |

NOTE 1: PUSCH mapping Type-A and single-symbol DM-RS configuration Type-1 with 2 additional DM-RS symbols, such that the DM-RS positions are set to symbols 2, 7, 11. DMRS is [TDM'ed] with PUSCH data. DM-RS symbols are not counted.

NOTE 2: MCS Index is based on MCS Table 5.1.3.1-2 defined in TS 38.214 [10].

NOTE 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).

NOTE 4: The RMCs apply to all channel bandwidth where  $L_{CRB} \leq N_{RB}$ .

Table A.2.2.5-2: Void

Table A.2.2.5-3: Void

## A.2.2.6 CP-OFDM QPSK

Table A.2.2.6-1: Reference Channels for CP-OFDM QPSK

| Parameter | Allocated resource blocks (L <sub>CRB</sub> ) | CP-OFDM Symbols per slot (Note 1) | Modulation | MCS Index (Note 2) | Payload size | Transport block CRC | LDPC Base Graph | Number of code blocks per slot (Note 3) | Total number of bits per slot | Total modulated symbols per slot |
|-----------|-----------------------------------------------|-----------------------------------|------------|--------------------|--------------|---------------------|-----------------|-----------------------------------------|-------------------------------|----------------------------------|
| Unit      |                                               |                                   |            |                    | Bits         | Bits                |                 |                                         | Bits                          |                                  |
|           | 1                                             | 11                                | QPSK       | 2                  | 48           | 16                  | 2               | 1                                       | 264                           | 132                              |
|           | 5                                             | 11                                | QPSK       | 2                  | 256          | 16                  | 2               | 1                                       | 1320                          | 660                              |
|           | 6                                             | 11                                | QPSK       | 2                  | 304          | 16                  | 2               | 1                                       | 1584                          | 792                              |
|           | 9                                             | 11                                | QPSK       | 2                  | 456          | 16                  | 2               | 1                                       | 2376                          | 1188                             |
|           | 10                                            | 11                                | QPSK       | 2                  | 504          | 16                  | 2               | 1                                       | 2640                          | 1320                             |
|           | 11                                            | 11                                | QPSK       | 2                  | 552          | 16                  | 2               | 1                                       | 2904                          | 1452                             |
|           | 12                                            | 11                                | QPSK       | 2                  | 608          | 16                  | 2               | 1                                       | 3168                          | 1584                             |
|           | 13                                            | 11                                | QPSK       | 2                  | 672          | 16                  | 2               | 1                                       | 3432                          | 1716                             |
|           | 15                                            | 11                                | QPSK       | 2                  | 768          | 16                  | 2               | 1                                       | 3960                          | 1980                             |
|           | 16                                            | 11                                | QPSK       | 2                  | 808          | 16                  | 2               | 1                                       | 4224                          | 2112                             |
|           | 18                                            | 11                                | QPSK       | 2                  | 928          | 16                  | 2               | 1                                       | 4752                          | 2376                             |
|           | 19                                            | 11                                | QPSK       | 2                  | 984          | 16                  | 2               | 1                                       | 5016                          | 2508                             |
|           | 24                                            | 11                                | QPSK       | 2                  | 1192         | 16                  | 2               | 1                                       | 6336                          | 3168                             |
|           | 25                                            | 11                                | QPSK       | 2                  | 1256         | 16                  | 2               | 1                                       | 6600                          | 3300                             |
|           | 26                                            | 11                                | QPSK       | 2                  | 1288         | 16                  | 2               | 1                                       | 6864                          | 3432                             |
|           | 31                                            | 11                                | QPSK       | 2                  | 1544         | 16                  | 2               | 1                                       | 8184                          | 4092                             |
|           | 33                                            | 11                                | QPSK       | 2                  | 1672         | 16                  | 2               | 1                                       | 8712                          | 4356                             |
|           | 38                                            | 11                                | QPSK       | 2                  | 1928         | 16                  | 2               | 1                                       | 10032                         | 5016                             |
|           | 39                                            | 11                                | QPSK       | 2                  | 2024         | 16                  | 2               | 1                                       | 10296                         | 5148                             |
|           | 40                                            | 11                                | QPSK       | 2                  | 2024         | 16                  | 2               | 1                                       | 10560                         | 5280                             |
|           | 47                                            | 11                                | QPSK       | 2                  | 2408         | 16                  | 2               | 1                                       | 12408                         | 6204                             |
|           | 51                                            | 11                                | QPSK       | 2                  | 2536         | 16                  | 2               | 1                                       | 13464                         | 6732                             |
|           | 52                                            | 11                                | QPSK       | 2                  | 2600         | 16                  | 2               | 1                                       | 13728                         | 6864                             |
|           | 53                                            | 11                                | QPSK       | 2                  | 2664         | 16                  | 2               | 1                                       | 13992                         | 6996                             |
|           | 54                                            | 11                                | QPSK       | 2                  | 2664         | 16                  | 2               | 1                                       | 14256                         | 7128                             |
|           | 61                                            | 11                                | QPSK       | 2                  | 3104         | 16                  | 2               | 1                                       | 16104                         | 8052                             |
|           | 65                                            | 11                                | QPSK       | 2                  | 3240         | 16                  | 2               | 1                                       | 17160                         | 8580                             |
|           | 67                                            | 11                                | QPSK       | 2                  | 3368         | 16                  | 2               | 1                                       | 17688                         | 8844                             |
|           | 68                                            | 11                                | QPSK       | 2                  | 3368         | 16                  | 2               | 1                                       | 17952                         | 8976                             |
|           | 78                                            | 11                                | QPSK       | 2                  | 3848         | 24                  | 2               | 2                                       | 20592                         | 10296                            |
|           | 79                                            | 11                                | QPSK       | 2                  | 3912         | 24                  | 2               | 2                                       | 20856                         | 10428                            |
|           | 80                                            | 11                                | QPSK       | 2                  | 3976         | 24                  | 2               | 2                                       | 21120                         | 10560                            |
|           | 81                                            | 11                                | QPSK       | 2                  | 4040         | 24                  | 2               | 2                                       | 21384                         | 10692                            |
|           | 93                                            | 11                                | QPSK       | 2                  | 4616         | 24                  | 2               | 2                                       | 24552                         | 12276                            |
|           | 95                                            | 11                                | QPSK       | 2                  | 4744         | 24                  | 2               | 2                                       | 25080                         | 12540                            |
|           | 106                                           | 11                                | QPSK       | 2                  | 5256         | 24                  | 2               | 2                                       | 27984                         | 13992                            |
|           | 107                                           | 11                                | QPSK       | 2                  | 5256         | 24                  | 2               | 2                                       | 28248                         | 14124                            |
|           | 108                                           | 11                                | QPSK       | 2                  | 5384         | 24                  | 2               | 2                                       | 28512                         | 14256                            |
|           | 109                                           | 11                                | QPSK       | 2                  | 5384         | 24                  | 2               | 2                                       | 28776                         | 14388                            |
|           | 121                                           | 11                                | QPSK       | 2                  | 6024         | 24                  | 2               | 2                                       | 31944                         | 15972                            |
|           | 123                                           | 11                                | QPSK       | 2                  | 6152         | 24                  | 2               | 2                                       | 32472                         | 16236                            |
|           | 133                                           | 11                                | QPSK       | 2                  | 6664         | 24                  | 2               | 2                                       | 35112                         | 17556                            |
|           | 135                                           | 11                                | QPSK       | 2                  | 6664         | 24                  | 2               | 2                                       | 35640                         | 17820                            |
|           | 137                                           | 11                                | QPSK       | 2                  | 6792         | 24                  | 2               | 2                                       | 36168                         | 18084                            |
|           | 160                                           | 11                                | QPSK       | 2                  | 7944         | 24                  | 2               | 3                                       | 42240                         | 21120                            |
|           | 162                                           | 11                                | QPSK       | 2                  | 8064         | 24                  | 2               | 3                                       | 42768                         | 21384                            |
|           | 189                                           | 11                                | QPSK       | 2                  | 9480         | 24                  | 2               | 3                                       | 49896                         | 24948                            |
|           | 216                                           | 11                                | QPSK       | 2                  | 10752        | 24                  | 2               | 3                                       | 57024                         | 28512                            |
|           | 217                                           | 11                                | QPSK       | 2                  | 10752        | 24                  | 2               | 3                                       | 57288                         | 28644                            |
|           | 245                                           | 11                                | QPSK       | 2                  | 12296        | 24                  | 2               | 4                                       | 64680                         | 32340                            |
|           | 270                                           | 11                                | QPSK       | 2                  | 13320        | 24                  | 2               | 4                                       | 71280                         | 35640                            |
|           | 273                                           | 11                                | QPSK       | 2                  | 13576        | 24                  | 2               | 4                                       | 72072                         | 36036                            |

NOTE 1: PUSCH mapping Type-A and single-symbol DM-RS configuration Type-1 with 2 additional DM-RS symbols, such that the DM-RS positions are set to symbols 2, 7, 11. DM-RS is [TDM'ed] with PUSCH data. DM-RS symbols are not counted.

NOTE 2: MCS Index is based on MCS Table 5.1.3.1-1 defined in TS 38.214 [10].



NOTE 3: If more than one Code Block is present, an additional CRC sequence of  $L = 24$  Bits is attached to each Code Block (otherwise  $L = 0$  Bit).

NOTE 4: The RMCs apply to all channel bandwidth where  $L_{CRB} \leq N_{RB}$ .

Table A.2.2.6-2: Void

Table A.2.2.6-3: Void

## A.2.2.7 CP-OFDM 16QAM

Table A.2.2.7-1: Reference Channels for CP-OFDM 16QAM

| Parameter | Allocated resource blocks (L <sub>CRB</sub> ) | CP-OFDM Symbols per slot (Note 1) | Modulation | MCS Index (Note 2) | Payload size | Transport block CRC | LDPC Base Graph | Number of code blocks per slot (Note 3) | Total number of bits per slot | Total modulated symbols per slot |
|-----------|-----------------------------------------------|-----------------------------------|------------|--------------------|--------------|---------------------|-----------------|-----------------------------------------|-------------------------------|----------------------------------|
| Unit      |                                               |                                   |            |                    | Bits         | Bits                |                 |                                         | Bits                          |                                  |
|           | 1                                             | 11                                | 16QAM      | 10                 | 176          | 16                  | 2               | 1                                       | 528                           | 132                              |
|           | 5                                             | 11                                | 16QAM      | 10                 | 888          | 16                  | 2               | 1                                       | 2640                          | 660                              |
|           | 6                                             | 11                                | 16QAM      | 10                 | 1064         | 16                  | 2               | 1                                       | 3168                          | 792                              |
|           | 9                                             | 11                                | 16QAM      | 10                 | 1608         | 16                  | 2               | 1                                       | 4752                          | 1188                             |
|           | 10                                            | 11                                | 16QAM      | 10                 | 1800         | 16                  | 2               | 1                                       | 5280                          | 1320                             |
|           | 11                                            | 11                                | 16QAM      | 10                 | 1928         | 16                  | 2               | 1                                       | 5808                          | 1452                             |
|           | 12                                            | 11                                | 16QAM      | 10                 | 2088         | 16                  | 2               | 1                                       | 6336                          | 1584                             |
|           | 13                                            | 11                                | 16QAM      | 10                 | 2280         | 16                  | 2               | 1                                       | 6864                          | 1716                             |
|           | 15                                            | 11                                | 16QAM      | 10                 | 2664         | 16                  | 2               | 1                                       | 7920                          | 1980                             |
|           | 16                                            | 11                                | 16QAM      | 10                 | 2792         | 16                  | 2               | 1                                       | 8448                          | 2112                             |
|           | 18                                            | 11                                | 16QAM      | 10                 | 3240         | 16                  | 2               | 1                                       | 9504                          | 2376                             |
|           | 19                                            | 11                                | 16QAM      | 10                 | 3368         | 16                  | 2               | 1                                       | 10032                         | 2508                             |
|           | 24                                            | 11                                | 16QAM      | 10                 | 4224         | 24                  | 1               | 1                                       | 12672                         | 3168                             |
|           | 25                                            | 11                                | 16QAM      | 10                 | 4352         | 24                  | 1               | 1                                       | 13200                         | 3300                             |
|           | 26                                            | 11                                | 16QAM      | 10                 | 4480         | 24                  | 1               | 1                                       | 13728                         | 3432                             |
|           | 31                                            | 11                                | 16QAM      | 10                 | 5376         | 24                  | 1               | 1                                       | 16368                         | 4092                             |
|           | 33                                            | 11                                | 16QAM      | 10                 | 5760         | 24                  | 1               | 1                                       | 17424                         | 4356                             |
|           | 38                                            | 11                                | 16QAM      | 10                 | 6656         | 24                  | 1               | 1                                       | 20064                         | 5016                             |
|           | 39                                            | 11                                | 16QAM      | 10                 | 6784         | 24                  | 1               | 1                                       | 20592                         | 5148                             |
|           | 40                                            | 11                                | 16QAM      | 10                 | 7040         | 24                  | 1               | 1                                       | 21120                         | 5280                             |
|           | 47                                            | 11                                | 16QAM      | 10                 | 8192         | 24                  | 1               | 1                                       | 24816                         | 6204                             |
|           | 51                                            | 11                                | 16QAM      | 10                 | 8968         | 24                  | 1               | 2                                       | 26928                         | 6732                             |
|           | 52                                            | 11                                | 16QAM      | 10                 | 9224         | 24                  | 1               | 2                                       | 27456                         | 6864                             |
|           | 53                                            | 11                                | 16QAM      | 10                 | 9224         | 24                  | 1               | 2                                       | 27984                         | 6996                             |
|           | 54                                            | 11                                | 16QAM      | 10                 | 9480         | 24                  | 1               | 2                                       | 28512                         | 7128                             |
|           | 61                                            | 11                                | 16QAM      | 10                 | 10760        | 24                  | 1               | 2                                       | 32208                         | 8052                             |
|           | 65                                            | 11                                | 16QAM      | 10                 | 11272        | 24                  | 1               | 2                                       | 34320                         | 8580                             |
|           | 67                                            | 11                                | 16QAM      | 10                 | 11784        | 24                  | 1               | 2                                       | 35376                         | 8844                             |
|           | 68                                            | 11                                | 16QAM      | 10                 | 11784        | 24                  | 1               | 2                                       | 35904                         | 8976                             |
|           | 78                                            | 11                                | 16QAM      | 10                 | 13576        | 24                  | 1               | 2                                       | 41184                         | 10296                            |
|           | 79                                            | 11                                | 16QAM      | 10                 | 13832        | 24                  | 1               | 2                                       | 41712                         | 10428                            |
|           | 80                                            | 11                                | 16QAM      | 10                 | 14088        | 24                  | 1               | 2                                       | 42240                         | 10560                            |
|           | 81                                            | 11                                | 16QAM      | 10                 | 14088        | 24                  | 1               | 2                                       | 42768                         | 10692                            |
|           | 93                                            | 11                                | 16QAM      | 10                 | 16392        | 24                  | 1               | 2                                       | 49404                         | 12276                            |
|           | 95                                            | 11                                | 16QMA      | 10                 | 16392        | 24                  | 1               | 2                                       | 50160                         | 12540                            |
|           | 106                                           | 11                                | 16QAM      | 10                 | 18432        | 24                  | 1               | 3                                       | 55968                         | 13992                            |
|           | 107                                           | 11                                | 16QAM      | 10                 | 18960        | 24                  | 1               | 3                                       | 56496                         | 14124                            |
|           | 108                                           | 11                                | 16QAM      | 10                 | 18960        | 24                  | 1               | 3                                       | 57024                         | 14256                            |
|           | 109                                           | 11                                | 16QAM      | 10                 | 18960        | 24                  | 1               | 3                                       | 57552                         | 14388                            |
|           | 121                                           | 11                                | 16QAM      | 10                 | 21000        | 24                  | 1               | 3                                       | 63888                         | 15972                            |
|           | 123                                           | 11                                | 16QAM      | 10                 | 21504        | 24                  | 1               | 3                                       | 64944                         | 16236                            |
|           | 133                                           | 11                                | 16QAM      | 10                 | 23040        | 24                  | 1               | 3                                       | 70224                         | 17556                            |
|           | 135                                           | 11                                | 16QAM      | 10                 | 23568        | 24                  | 1               | 3                                       | 71280                         | 17820                            |
|           | 137                                           | 11                                | 16QAM      | 10                 | 24072        | 24                  | 1               | 3                                       | 72336                         | 18084                            |
|           | 160                                           | 11                                | 16QAM      | 10                 | 28168        | 24                  | 1               | 4                                       | 84480                         | 21120                            |
|           | 162                                           | 11                                | 16QAM      | 10                 | 28168        | 24                  | 1               | 4                                       | 85536                         | 21384                            |
|           | 189                                           | 11                                | 16QAM      | 10                 | 32776        | 24                  | 1               | 4                                       | 99792                         | 24948                            |
|           | 216                                           | 11                                | 16QAM      | 10                 | 37896        | 24                  | 1               | 5                                       | 114048                        | 28512                            |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |    |       |    |       |    |   |   |        |       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----|-------|----|-------|----|---|---|--------|-------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 217 | 11 | 16QAM | 10 | 37896 | 24 | 1 | 5 | 114576 | 28644 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 245 | 11 | 16QAM | 10 | 43032 | 24 | 1 | 6 | 129360 | 32340 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 270 | 11 | 16QAM | 10 | 47112 | 24 | 1 | 6 | 142560 | 35640 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 273 | 11 | 16QAM | 10 | 48168 | 24 | 1 | 6 | 144144 | 36036 |
| NOTE 1: PUSCH mapping Type-A and single-symbol DM-RS configuration Type-1 with 2 additional DM-RS symbols, such that the DM-RS positions are set to symbols 2, 7, 11. DMRS is [TDM'ed] with PUSCH data. DM-RS symbols are not counted.<br>NOTE 2: MCS Index is based on MCS Table 5.1.3.1-1 defined in TS 38.214 [10].<br>NOTE 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).<br>NOTE 4: The RMCs apply to all channel bandwidth where $L_{CRB} \leq N_{RB}$ . |     |    |       |    |       |    |   |   |        |       |

Table A.2.2.7-2: Void

Table A.2.2.7-3: Void

## A.2.2.8 CP-OFDM 64QAM

Table A.2.2.8-1: Reference Channels for CP-OFDM 64QAM

| Parameter | Allocated resource blocks (L <sub>CRB</sub> ) | CP-OFDM Symbols per slot (Note 1) | Modulation | MCS Index (Note 2) | Payload size | Transport block CRC | LDPC Base Graph | Number of code blocks per slot (Note 3) | Total number of bits per slot | Total modulated symbols per slot |
|-----------|-----------------------------------------------|-----------------------------------|------------|--------------------|--------------|---------------------|-----------------|-----------------------------------------|-------------------------------|----------------------------------|
| Unit      |                                               |                                   |            |                    | Bits         | Bits                |                 |                                         | Bits                          |                                  |
|           | 1                                             | 11                                | 64QAM      | 19                 | 408          | 16                  | 2               | 1                                       | 792                           | 132                              |
|           | 5                                             | 11                                | 64QAM      | 19                 | 2024         | 16                  | 2               | 1                                       | 3960                          | 660                              |
|           | 9                                             | 11                                | 64QAM      | 19                 | 3624         | 16                  | 2               | 1                                       | 7128                          | 1188                             |
|           | 10                                            | 11                                | 64QAM      | 19                 | 3968         | 24                  | 1               | 1                                       | 7920                          | 1320                             |
|           | 11                                            | 11                                | 64QAM      | 19                 | 4352         | 24                  | 1               | 1                                       | 8712                          | 1452                             |
|           | 12                                            | 11                                | 64QAM      | 19                 | 4736         | 24                  | 1               | 1                                       | 9504                          | 1584                             |
|           | 13                                            | 11                                | 64QAM      | 19                 | 5120         | 24                  | 1               | 1                                       | 10296                         | 1716                             |
|           | 15                                            | 11                                | 64QAM      | 19                 | 6016         | 24                  | 1               | 1                                       | 11880                         | 1980                             |
|           | 18                                            | 11                                | 64QAM      | 19                 | 7168         | 24                  | 1               | 1                                       | 14256                         | 2376                             |
|           | 19                                            | 11                                | 64QAM      | 19                 | 7552         | 24                  | 1               |                                         | 15048                         | 2508                             |
|           | 24                                            | 11                                | 64QAM      | 19                 | 9480         | 24                  | 1               | 2                                       | 19008                         | 3168                             |
|           | 25                                            | 11                                | 64QAM      | 19                 | 9992         | 24                  | 1               | 2                                       | 19800                         | 3300                             |
|           | 26                                            | 11                                | 64QAM      | 19                 | 10504        | 24                  | 1               | 2                                       | 20592                         | 3432                             |
|           | 31                                            | 11                                | 64QAM      | 19                 | 12296        | 24                  | 1               | 2                                       | 24552                         | 4092                             |
|           | 33                                            | 11                                | 64QAM      | 19                 | 13064        | 24                  | 1               | 2                                       | 26136                         | 4356                             |
|           | 38                                            | 11                                | 64QAM      | 19                 | 15112        | 24                  | 1               | 2                                       | 30096                         | 5016                             |
|           | 39                                            | 11                                | 64QAM      | 19                 | 15624        | 24                  | 1               | 2                                       | 30888                         | 5148                             |
|           | 47                                            | 11                                | 64QAM      | 19                 | 18960        | 24                  | 1               | 3                                       | 37224                         | 6204                             |
|           | 51                                            | 11                                | 64QAM      | 19                 | 20496        | 24                  | 1               | 3                                       | 40392                         | 6732                             |
|           | 52                                            | 11                                | 64QAM      | 19                 | 21000        | 24                  | 1               | 3                                       | 41184                         | 6864                             |
|           | 53                                            | 11                                | 64QAM      | 19                 | 21000        | 24                  | 1               | 3                                       | 41976                         | 6996                             |
|           | 61                                            | 11                                | 64QAM      | 19                 | 24567        | 24                  | 1               | 3                                       | 48312                         | 8052                             |
|           | 65                                            | 11                                | 64QAM      | 19                 | 26120        | 24                  | 1               | 4                                       | 51480                         | 8580                             |
|           | 67                                            | 11                                | 64QAM      | 19                 | 26632        | 24                  | 1               | 4                                       | 53064                         | 8844                             |
|           | 78                                            | 11                                | 64QAM      | 19                 | 31240        | 24                  | 1               | 4                                       | 61776                         | 10296                            |
|           | 79                                            | 11                                | 64QAM      | 19                 | 31752        | 24                  | 1               | 4                                       | 62568                         | 10428                            |
|           | 80                                            | 11                                | 64QAM      | 19                 | 31752        | 24                  | 1               | 4                                       | 63360                         | 10560                            |
|           | 81                                            | 11                                | 64QAM      | 19                 | 32264        | 24                  | 1               | 4                                       | 64152                         | 10692                            |
|           | 93                                            | 11                                | 64QAM      | 19                 | 36896        | 24                  | 1               | 5                                       | 73656                         | 12276                            |
|           | 95                                            | 11                                | 64QAM      | 19                 | 37896        | 24                  | 1               | 5                                       | 75240                         | 12540                            |
|           | 93                                            | 11                                | 64QAM      | 19                 | 36896        | 24                  | 1               | 5                                       | 73656                         | 12276                            |
|           | 106                                           | 11                                | 64QAM      | 19                 | 42016        | 24                  | 1               | 5                                       | 83952                         | 13992                            |
|           | 107                                           | 11                                | 64QAM      | 19                 | 43032        | 24                  | 1               | 6                                       | 84744                         | 14124                            |
|           | 108                                           | 11                                | 64QAM      | 19                 | 43032        | 24                  | 1               | 6                                       | 85536                         | 14256                            |
|           | 109                                           | 11                                | 64QAM      | 19                 | 44040        | 24                  | 1               | 6                                       | 86328                         | 14388                            |
|           | 121                                           | 11                                | 64QAM      | 19                 | 48168        | 24                  | 1               | 6                                       | 95832                         | 15972                            |
|           | 123                                           | 11                                | 64QAM      | 19                 | 49176        | 24                  | 1               | 6                                       | 97416                         | 16236                            |
|           | 133                                           | 11                                | 64QAM      | 19                 | 53288        | 24                  | 1               | 7                                       | 105336                        | 17556                            |
|           | 135                                           | 11                                | 64QAM      | 19                 | 54296        | 24                  | 1               | 7                                       | 106920                        | 17820                            |
|           | 137                                           | 11                                | 64QAM      | 19                 | 54296        | 24                  | 1               | 7                                       | 108504                        | 18084                            |
|           | 160                                           | 11                                | 64QAM      | 19                 | 63528        | 24                  | 1               | 8                                       | 126720                        | 21120                            |
|           | 162                                           | 11                                | 64QAM      | 19                 | 64552        | 24                  | 1               | 8                                       | 128304                        | 21384                            |
|           | 189                                           | 11                                | 64QAM      | 19                 | 75792        | 24                  | 1               | 9                                       | 149688                        | 24948                            |
|           | 216                                           | 11                                | 64QAM      | 19                 | 86040        | 24                  | 1               | 11                                      | 171072                        | 28512                            |
|           | 217                                           | 11                                | 64QAM      | 19                 | 86040        | 24                  | 1               | 11                                      | 171864                        | 28644                            |
|           | 245                                           | 11                                | 64QAM      | 19                 | 98376        | 24                  | 1               | 12                                      | 194040                        | 32340                            |
|           | 270                                           | 11                                | 64QAM      | 19                 | 108552       | 24                  | 1               | 13                                      | 213840                        | 35640                            |
|           | 273                                           | 11                                | 64QAM      | 19                 | 108552       | 24                  | 1               | 13                                      | 216216                        | 36036                            |

- NOTE 1: PUSCH mapping Type-A and single-symbol DM-RS configuration Type-1 with 2 additional DM-RS symbols, such that the DM-RS positions are set to symbols 2, 7, 11. DMRS is [TDM'ed] with PUSCH data. DM-RS symbols are not counted.
- NOTE 2: MCS Index is based on MCS Table 5.1.3.1-1 defined in TS 38.214 [10].
- NOTE 3: If more than one Code Block is present, an additional CRC sequence of  $L = 24$  Bits is attached to each Code Block (otherwise  $L = 0$  Bit).
- NOTE 4: The RMCs apply to all channel bandwidth where  $L_{CRB} \leq N_{RB}$ .

Table A.2.2.8-2: Void

Table A.2.2.8-3: Void

## A.2.2.9 CP-OFDM 256QAM

Table A.2.2.9-1: Reference Channels for CP-OFDM 256QAM

| Parameter | Allocated resource blocks (L <sub>CRB</sub> ) | CP-OFDM Symbols per slot (Note 1) | Modulation | MCS Index (Note 2) | Payload size | Transport block CRC | LDPC Base Graph | Number of code blocks per slot (Note 3) | Total number of bits per slot | Total modulated symbols per slot |
|-----------|-----------------------------------------------|-----------------------------------|------------|--------------------|--------------|---------------------|-----------------|-----------------------------------------|-------------------------------|----------------------------------|
| Unit      |                                               |                                   |            |                    | Bits         | Bits                |                 |                                         | Bits                          |                                  |
|           | 1                                             | 11                                | 256QAM     | 20                 | 704          | 16                  | 2               | 1                                       | 1056                          | 132                              |
|           | 5                                             | 11                                | 256QAM     | 20                 | 3496         | 16                  | 2               | 1                                       | 5280                          | 660                              |
|           | 9                                             | 11                                | 256QAM     | 20                 | 6272         | 24                  | 1               | 1                                       | 9504                          | 1188                             |
|           | 10                                            | 11                                | 256QAM     | 20                 | 7040         | 24                  | 1               | 1                                       | 10560                         | 1320                             |
|           | 11                                            | 11                                | 256QAM     | 20                 | 7680         | 24                  | 1               | 1                                       | 11616                         | 1452                             |
|           | 12                                            | 11                                | 256QAM     | 20                 | 8456         | 24                  | 1               | 2                                       | 12672                         | 1584                             |
|           | 13                                            | 11                                | 256QAM     | 20                 | 9224         | 24                  | 1               | 2                                       | 13728                         | 1716                             |
|           | 15                                            | 11                                | 256QAM     | 20                 | 10504        | 24                  | 1               | 2                                       | 15840                         | 1980                             |
|           | 18                                            | 11                                | 256QAM     | 20                 | 12552        | 24                  | 1               | 2                                       | 19008                         | 2376                             |
|           | 19                                            | 11                                | 256QAM     | 20                 | 13320        | 24                  | 1               | 2                                       | 20064                         | 2508                             |
|           | 24                                            | 11                                | 256QAM     | 20                 | 16896        | 24                  | 1               | 3                                       | 25344                         | 3168                             |
|           | 25                                            | 11                                | 256QAM     | 20                 | 17424        | 24                  | 1               | 3                                       | 26400                         | 3300                             |
|           | 26                                            | 11                                | 256QAM     | 20                 | 18432        | 24                  | 1               | 3                                       | 27456                         | 3432                             |
|           | 31                                            | 11                                | 256QAM     | 20                 | 22032        | 24                  | 1               | 3                                       | 32736                         | 4092                             |
|           | 33                                            | 11                                | 256QAM     | 20                 | 23040        | 24                  | 1               | 3                                       | 34848                         | 4356                             |
|           | 38                                            | 11                                | 256QAM     | 20                 | 26632        | 24                  | 1               | 4                                       | 40128                         | 5016                             |
|           | 39                                            | 11                                | 256QAM     | 20                 | 27656        | 24                  | 1               | 4                                       | 41184                         | 5148                             |
|           | 47                                            | 11                                | 256QAM     | 20                 | 32776        | 24                  | 1               | 4                                       | 49632                         | 6204                             |
|           | 51                                            | 11                                | 256QAM     | 20                 | 35856        | 24                  | 1               | 5                                       | 53856                         | 6732                             |
|           | 52                                            | 11                                | 256QAM     | 20                 | 36896        | 24                  | 1               | 5                                       | 54912                         | 6864                             |
|           | 53                                            | 11                                | 256QAM     | 20                 | 36896        | 24                  | 1               | 5                                       | 55968                         | 6996                             |
|           | 61                                            | 11                                | 256QAM     | 20                 | 43032        | 24                  | 1               | 6                                       | 64416                         | 8052                             |
|           | 65                                            | 11                                | 256QAM     | 20                 | 46104        | 24                  | 1               | 6                                       | 68640                         | 8580                             |
|           | 67                                            | 11                                | 256QAM     | 20                 | 47112        | 24                  | 1               | 6                                       | 70752                         | 8844                             |
|           | 78                                            | 11                                | 256QAM     | 20                 | 55304        | 24                  | 1               | 7                                       | 82368                         | 10296                            |
|           | 79                                            | 11                                | 256QAM     | 20                 | 55304        | 24                  | 1               | 7                                       | 83424                         | 10428                            |
|           | 80                                            | 11                                | 256QAM     | 20                 | 56368        | 24                  | 1               | 7                                       | 84480                         | 10560                            |
|           | 81                                            | 11                                | 256QAM     | 20                 | 57376        | 24                  | 1               | 7                                       | 85536                         | 10692                            |
|           | 93                                            | 11                                | 256QAM     | 20                 | 65576        | 24                  | 1               | 8                                       | 98208                         | 12276                            |
|           | 95                                            | 11                                | 256QAM     | 20                 | 67584        | 24                  | 1               | 8                                       | 100320                        | 12540                            |
|           | 106                                           | 11                                | 256QAM     | 20                 | 73776        | 24                  | 1               | 9                                       | 111936                        | 13992                            |
|           | 107                                           | 11                                | 256QAM     | 20                 | 75792        | 24                  | 1               | 9                                       | 112992                        | 14124                            |
|           | 108                                           | 11                                | 256QAM     | 20                 | 75792        | 24                  | 1               | 9                                       | 114048                        | 14256                            |
|           | 109                                           | 11                                | 256QAM     | 20                 | 75792        | 24                  | 1               | 9                                       | 115104                        | 14388                            |
|           | 121                                           | 11                                | 256QAM     | 20                 | 86040        | 24                  | 1               | 11                                      | 127776                        | 15972                            |
|           | 123                                           | 11                                | 256QAM     | 20                 | 86040        | 24                  | 1               | 11                                      | 129888                        | 16236                            |
|           | 133                                           | 11                                | 256QAM     | 20                 | 94248        | 24                  | 1               | 12                                      | 140448                        | 17556                            |
|           | 135                                           | 11                                | 256QAM     | 20                 | 94248        | 24                  | 1               | 12                                      | 142560                        | 17820                            |
|           | 137                                           | 11                                | 256QAM     | 20                 | 96264        | 24                  | 1               | 12                                      | 144672                        | 18084                            |
|           | 160                                           | 11                                | 256QAM     | 20                 | 112648       | 24                  | 1               | 14                                      | 168960                        | 21120                            |
|           | 162                                           | 11                                | 256QAM     | 20                 | 114776       | 24                  | 1               | 14                                      | 171072                        | 21384                            |
|           | 189                                           | 11                                | 256QAM     | 20                 | 131176       | 24                  | 1               | 16                                      | 199584                        | 24948                            |
|           | 216                                           | 11                                | 256QAM     | 20                 | 151608       | 24                  | 1               | 18                                      | 228096                        | 28512                            |
|           | 217                                           | 11                                | 256QAM     | 20                 | 151608       | 24                  | 1               | 18                                      | 229152                        | 28644                            |
|           | 245                                           | 11                                | 256QAM     | 20                 | 172176       | 24                  | 1               | 21                                      | 258720                        | 32340                            |
|           | 270                                           | 11                                | 256QAM     | 20                 | 188576       | 24                  | 1               | 23                                      | 285120                        | 35640                            |
|           | 273                                           | 11                                | 256QAM     | 20                 | 192624       | 24                  | 1               | 23                                      | 288288                        | 36036                            |

|         |                                                                                                                                                                                                                                |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NOTE 1: | PUSCH mapping Type-A and single-symbol DM-RS configuration Type-1 with 2 additional DM-RS symbols, such that the DM-RS positions are set to symbols 2, 7, 11. DMRS is [TDM'ed] with PUSCH data. DM-RS symbols are not counted. |
| NOTE 2: | MCS Index is based on MCS Table 5.1.3.1-2 defined in TS 38.214 [10].                                                                                                                                                           |
| NOTE 3: | If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).                                                                                        |
| NOTE 4: | The RMCs apply to all channel bandwidth where $L_{CRB} \leq N_{RB}$ .                                                                                                                                                          |

**Table A.2.2.9-2: Void**

**Table A.2.2.9-3: Void**

## A.2.3 Reference measurement channels for TDD

The TDD UL RMCs are defined in clause A.2.2 with the active UL slots specified in Table A.2.1-1 and TDD slot patterns as defined for reference sensitivity tests.

The TDD UL RMCs for the phase continuity tests for DMRS bundling are defined in clause A.2.2 with the active UL slots and TDD pattern specified in tables A.2.1-2 and A.2.1-3.

### A.2.3.1 DFT-s-OFDM Pi/2-BPSK

Table A.2.3.1-1: Void

Table A.2.3.1-2: Void

Table A.2.3.1-3: Void

### A.2.3.2 DFT-s-OFDM QPSK

Table A.2.3.2-1: Void

Table A.2.3.2-2: Void

Table A.2.3.2-3: Void

### A.2.3.3 DFT-s-OFDM 16QAM

Table A.2.3.3-1: Void

Table A.2.3.3-2: Void

Table A.2.3.3-3: Void

### A.2.3.4 DFT-s-OFDM 64QAM

Table A.2.3.4-1: Void

Table A.2.3.4-2: Void



Table A.2.3.4-3: Void

A.2.3.5 DFT-s-OFDM 256QAM

Table A.2.3.5-1: Void

Table A.2.3.5-2: Void

Table A.2.3.5-3: Void

A.2.3.6 CP-OFDM QPSK

Table A.2.3.6-1: Void

Table A.2.3.6-2: Void

Table A.2.3.6-3: Void

A.2.3.7 CP-OFDM 16QAM

Table A.2.3.7-1: Void

Table A.2.3.7-2: Void

Table A.2.3.7-3: Void

A.2.3.8 CP-OFDM 64QAM

Table A.2.3.8-1: Void

Table A.2.3.8-2: Void

Table A.2.3.8-3: Void

A.2.3.9 CP-OFDM 256QAM

Table A.2.3.9-1: Void

Table A.2.3.9-2: Void

Table A.2.3.9-3: Void

## A.3 DL reference measurement channels

### A.3.1 General

Unless otherwise stated, Tables A.3.2.2-1, A.3.2.2-2, A.3.2.2-3, A.3.3.2-1, A.3.3.2-2 and A.3.3.2-3 are applicable for measurements of the Receiver Characteristics (clause 7) with the exception of clauses 7.4 (Maximum input level).

Unless otherwise stated, Tables A.3.2.3-1, A.3.2.3-2, A.3.2.3-3, A.3.3.3-1, A.3.3.3-2 and A.3.3.3-3 are applicable for clauses 7.4 (Maximum input level) and for UE not supporting PDSCH 256QAM,

Unless otherwise stated, Tables A.3.2.4-1, A.3.2.4-2, A.3.2.4-3, A.3.3.4-1, A.3.3.4-2 and A.3.3.4-3 are applicable for clauses 7.4 (Maximum input level) and for UE supporting PDSCH 256QAM,

Unless otherwise stated, Tables A.3.2.2-1, A.3.2.2-2, A.3.2.2-3, A.3.3.2-1, A.3.3.2-2 and A.3.3.2-3 also apply for the modulated interferer used in Clauses 7.5, 7.6 and 7.8 with test specific bandwidths.

In case of carrier aggregation scenarios, the  $k_1$  values and number of HARQ processes of the Reference Measurement Channels specified in Annex A.3 shall be adapted as specified in Tables A.3.1-2 and A.3.1-3.

**Table A.3.1-1: Common reference channel parameters**

| Parameter                                    |                                                             | Unit  | Value                                                                                                                                                                                                                                                   |
|----------------------------------------------|-------------------------------------------------------------|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CORESET frequency domain allocation          |                                                             |       | Full BW                                                                                                                                                                                                                                                 |
| CORESET time domain allocation               |                                                             |       | 2 OFDM symbols at the begin of each slot                                                                                                                                                                                                                |
| PDSCH mapping type                           |                                                             |       | Type A                                                                                                                                                                                                                                                  |
| PDSCH start symbol index (S)                 |                                                             |       | 2                                                                                                                                                                                                                                                       |
| Number of consecutive PDSCH symbols (L)      |                                                             |       | 12                                                                                                                                                                                                                                                      |
| PDSCH PRB bundling                           |                                                             | PRBs  | 2                                                                                                                                                                                                                                                       |
| Dynamic PRB bundling                         |                                                             |       | false                                                                                                                                                                                                                                                   |
| Overhead value for TBS determination         |                                                             |       | 0                                                                                                                                                                                                                                                       |
| First DMRS position for Type A PDSCH mapping |                                                             |       | 2                                                                                                                                                                                                                                                       |
| DMRS type                                    |                                                             |       | Type 1                                                                                                                                                                                                                                                  |
| Number of additional DMRS                    |                                                             |       | 2                                                                                                                                                                                                                                                       |
| FDM between DMRS and PDSCH                   |                                                             |       | Disable                                                                                                                                                                                                                                                 |
| CSI-RS for tracking                          | First subcarrier index in the PRB used for CSI-RS ( $k_0$ ) |       | 0 for CSI-RS resource 1,2,3,4                                                                                                                                                                                                                           |
|                                              | OFDM symbols in the PRB used for CSI-RS                     |       | $l_0 = 6$ for CSI-RS resource 1 and 3<br>$l_0 = 10$ for CSI-RS resource 2 and 4                                                                                                                                                                         |
|                                              | Number of CSI-RS ports                                      |       | 1 for CSI-RS resource 1,2,3,4                                                                                                                                                                                                                           |
|                                              | CDM Type                                                    |       | 'No CDM' for CSI-RS resource 1,2,3,4                                                                                                                                                                                                                    |
|                                              | Density ( $\rho$ )                                          |       | 3 for CSI-RS resource 1,2,3,4                                                                                                                                                                                                                           |
|                                              | CSI-RS periodicity                                          | Slots | 15 kHz SCS: 20 for CSI-RS resource 1,2,3,4<br>30 kHz SCS: 40 for CSI-RS resource 1,2,3,4<br>60 kHz SCS: 80 for CSI-RS resource 1,2,3,4                                                                                                                  |
|                                              | CSI-RS offset                                               | Slots | 15 kHz SCS:<br>0 for CSI-RS resource 1 and 2<br>1 for CSI-RS resource 3 and 4<br><br>30 kHz SCS:<br>1 for CSI-RS resource 1 and 2<br>2 for CSI-RS resource 3 and 4<br><br>60 kHz SCS:<br>2 for CSI-RS resource 1 and 2<br>3 for CSI-RS resource 3 and 4 |
|                                              | Frequency Occupation                                        |       | Start PRB 0<br>Number of PRB = BWP size                                                                                                                                                                                                                 |
| PTRS configuration                           |                                                             |       | QCL info<br>TCI state #0<br>PTRS is not configured                                                                                                                                                                                                      |

**Table A.3.1-2: Carrier aggregation test parameters for K1 values**

| The number of slots between PDSCH and corresponding HARQ-ACK information                                                                         |             | CCs with the same duplex mode and SCS with Pcell | CCs with different duplex mode and/or SCS with Pcell |
|--------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------------------------------------------|------------------------------------------------------|
| FDD 15 kHz +<br>FDD 15 kHz CA                                                                                                                    | FDD PCell   | {2}                                              | N/A                                                  |
| FDD 15 kHz +<br>FDD 30 kHz CA                                                                                                                    | 15kHz PCell | {2}                                              | {3}                                                  |
|                                                                                                                                                  | 30kHz PCell | {2}                                              | {2}                                                  |
| FDD 15 kHz +<br>TDD 15 kHz CA                                                                                                                    | FDD PCell   | {2}                                              | {2}                                                  |
|                                                                                                                                                  | TDD PCell   | {4,3,2}                                          | {4,3,2,6,5}                                          |
| FDD 15 kHz +<br>TDD 30 kHz CA                                                                                                                    | FDD PCell   | {2}                                              | {3}                                                  |
|                                                                                                                                                  | TDD PCell   | {8,7,6,5,4,3,2}                                  | {8,6,4,2,10}                                         |
| TDD 15 kHz +<br>TDD 15 kHz CA                                                                                                                    | TDD PCell   | {4,3,2}                                          | N/A                                                  |
| TDD 15 kHz +<br>TDD 30 kHz CA                                                                                                                    | 15kHz PCell | {4,3,2}                                          | {4,4,3,3,2,7,6}                                      |
|                                                                                                                                                  | 30kHz PCell | {8,7,6,5,4,3,2}                                  | {7,5,4}                                              |
| FDD 30 kHz +<br>FDD 30 kHz CA                                                                                                                    | FDD PCell   | {2}                                              | N/A                                                  |
| FDD 30 kHz +<br>TDD 15 kHz CA                                                                                                                    | FDD PCell   | {2}                                              | {2}                                                  |
|                                                                                                                                                  | TDD PCell   | {4,3,2}                                          | {4,4,3,3,7,7,6,6,5,5}                                |
| FDD 30 kHz +<br>TDD 30 kHz CA                                                                                                                    | FDD PCell   | {2}                                              | {2}                                                  |
|                                                                                                                                                  | TDD PCell   | {8,7,6,5,4,3,2}                                  | {8,7,6,5,4,3,2,2,10,-}<br>{(NOTE 1)}                 |
| TDD 30 kHz +<br>TDD 30 kHz CA                                                                                                                    | TDD PCell   | {8,7,6,5,4,3,2}                                  | N/A                                                  |
| NOTE 1: No PDSCH shall be scheduled in slots 9 and 19 to avoid HARQ conflicts and maximize Throughput. Hence no K1 value is applicable for them. |             |                                                  |                                                      |

**Table A.3.1-3: Carrier Aggregation test parameters for number of HARQ processes**

| HARQ process number           |             | CCs with the same duplex mode and SCS with Pcell | CCs with different duplex mode and/or SCS with Pcell |
|-------------------------------|-------------|--------------------------------------------------|------------------------------------------------------|
| FDD 15 kHz +<br>FDD 15 kHz CA | FDD PCell   | 4                                                | N/A                                                  |
| FDD 15 kHz +<br>FDD 30 kHz CA | 15kHz PCell | 8                                                | 8                                                    |
|                               | 30kHz PCell | 8                                                | 8                                                    |
| FDD 15 kHz +<br>TDD 15 kHz CA | FDD PCell   | 4                                                | 8                                                    |
|                               | TDD PCell   | 8                                                | 8                                                    |
| FDD 15 kHz +<br>TDD 30 kHz CA | FDD PCell   | 4                                                | 8                                                    |
|                               | TDD PCell   | 10                                               | 8                                                    |
| TDD 15 kHz +<br>TDD 15 kHz CA | TDD PCell   | 8                                                | N/A                                                  |
| TDD 15 kHz +<br>TDD 30 kHz CA | 15kHz PCell | 8                                                | 12                                                   |
|                               | 30kHz PCell | 8                                                | 8                                                    |
| FDD 30 kHz +<br>FDD 30 kHz CA | FDD PCell   | 8                                                | N/A                                                  |
|                               |             |                                                  |                                                      |
| FDD 30 kHz +<br>TDD 15 kHz CA | FDD PCell   | 8                                                | 8                                                    |
|                               | TDD PCell   | 8                                                | 16                                                   |

|                               |           |   |     |
|-------------------------------|-----------|---|-----|
| FDD 30 kHz +<br>TDD 30 kHz CA | FDD PCell | 8 | 8   |
|                               | TDD PCell | 8 | 16  |
| TDD 30 kHz +<br>TDD 30 kHz CA | TDD PCell | 8 | N/A |

## A.3.2 DL reference measurement channels for FDD

### A.3.2.1 General

**Table A.3.2.1-1 Additional reference channels parameters for FDD**

| Parameter                | Unit | Value           |
|--------------------------|------|-----------------|
| Number of HARQ Processes |      | 4               |
| K1 value                 |      | 2 for all slots |

### A.3.2.2 FRC for receiver requirements for QPSK

**Table A.3.2.2-1 Fixed reference channel for receiver requirements (SCS 15 kHz, FDD, QPSK 1/3)**

| Parameter                               | Unit | Value |       |       |       |       |       |            |             |
|-----------------------------------------|------|-------|-------|-------|-------|-------|-------|------------|-------------|
| Channel bandwidth                       | MHz  | 5     | 10    | 15    | 20    | 25    | 30    | 40         | 50          |
| Subcarrier spacing                      | kHz  | 15    | 15    | 15    | 15    | 15    | 15    | 15         | 15          |
| Subcarrier spacing configuration $\mu$  |      | 0     | 0     | 0     | 0     | 0     | 0     | 0          | 0           |
| Allocated resource blocks               |      | 25    | 52    | 79    | 106   | 133   | 160   | 216        | 270         |
| Subcarriers per resource block          |      | 12    | 12    | 12    | 12    | 12    | 12    | 12         | 12          |
| Allocated slots per Frame               |      | 8     | 8     | 8     | 8     | 8     | 8     | 8          | 8           |
| MCS Index                               |      | 4     | 4     | 4     | 4     | 4     | 4     | 4          | 4           |
| MCS Table for TBS determination         |      | 64QAM |       |       |       |       |       |            |             |
| Modulation                              |      | QPSK  | QPSK  | QPSK  | QPSK  | QPSK  | QPSK  | QPSK       | QPSK        |
| Target Coding Rate                      |      | 1/3   | 1/3   | 1/3   | 1/3   | 1/3   | 1/3   | 1/3        | 1/3         |
| Maximum number of HARQ transmissions    |      | 1     | 1     | 1     | 1     | 1     | 1     | 1          | 1           |
| <b>Information Bit Payload per Slot</b> |      |       |       |       |       |       |       |            |             |
| For Slots 0,1                           | Bits | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A        | N/A         |
| For Slots 2,3,4,5,6,7,8,9               | Bits | 1672  | 3368  | 5120  | 6912  | 8712  | 10504 | 14088      | 17424       |
| Transport block CRC                     | Bits | 16    | 16    | 24    | 24    | 24    | 24    | 24         | 24          |
| LDPC base graph                         |      | 2     | 2     | 1     | 1     | 1     | 1     | 1          | 1           |
| <b>Number of Code Blocks per Slot</b>   |      |       |       |       |       |       |       |            |             |
| For Slots 0,1                           | CBs  | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A        | N/A         |
| For Slots 2,3,4,5,6,7,8,9               | CBs  | 1     | 1     | 1     | 1     | 2     | 2     | 2          | 3           |
| <b>Binary Channel Bits per Slot</b>     |      |       |       |       |       |       |       |            |             |
| For Slots 0,1                           | Bits | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A        | N/A         |
| For Slots 2,3,4,5,6,7,8,9               | Bits | 5400  | 11232 | 17064 | 22896 | 28728 | 34560 | 46656      | 58320       |
| Max. Throughput averaged over 1 frame   | Mbps | 1.338 | 2.694 | 4.096 | 5.530 | 6.970 | 8.403 | 11.27<br>0 | 13.93<br>92 |

NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.2.1-1.

NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).

NOTE 3: SS/PBCH block is transmitted in slot #0 of each frame

NOTE 4: Slot i is slot index per frame

Table A.3.2.2-2 Fixed reference channel for receiver requirements (SCS 30 kHz, FDD, QPSK 1/3)

| Parameter                              | Unit | Value |       |       |       |       |        |        |        |        |      |
|----------------------------------------|------|-------|-------|-------|-------|-------|--------|--------|--------|--------|------|
| Channel bandwidth                      | MHz  | 10    | 15    | 20    | 25    | 30    | 40     | 50     | 60     | 80     |      |
| Configuring configuration <sup>μ</sup> |      | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      |      |
| Number of resource blocks              |      | 24    | 38    | 51    | 65    | 78    | 106    | 133    | 162    | 217    |      |
| Number of resource blocks per Frame    |      | 12    | 12    | 12    | 12    | 12    | 12     | 12     | 12     | 12     |      |
|                                        |      | 17    | 17    | 17    | 17    | 17    | 17     | 17     | 17     | 17     |      |
|                                        |      | 4     | 4     | 4     | 4     | 4     | 4      | 4      | 4      | 4      |      |
| BS determination                       |      | 64QAM |       |       |       |       |        |        |        |        |      |
| Modulation                             |      | QPSK  | QPSK  | QPSK  | QPSK  | QPSK  | QPSK   | QPSK   | QPSK   | QPSK   | QPSK |
| Rate of HARQ transmissions             |      | 1/3   | 1/3   | 1/3   | 1/3   | 1/3   | 1/3    | 1/3    | 1/3    | 1/3    |      |
| Number of HARQ transmissions           |      | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      |      |
| Number of Code Blocks per Slot         |      |       |       |       |       |       |        |        |        |        |      |
|                                        | Bits | N/A   | N/A   | N/A   | N/A   | N/A   | N/A    | N/A    | N/A    | N/A    |      |
| Number of Code Blocks per Slot         | Bits | 1608  | 2472  | 3368  | 4224  | 4992  | 6912   | 8712   | 10504  | 14088  | 1    |
| CRC                                    | Bits | 16    | 16    | 16    | 24    | 24    | 24     | 24     | 24     | 24     |      |
| Number of Code Blocks per Slot         |      | 2     | 2     | 2     | 1     | 1     | 1      | 1      | 1      | 1      |      |
| Number of Code Blocks per Slot         |      |       |       |       |       |       |        |        |        |        |      |
|                                        | CBs  | N/A   | N/A   | N/A   | N/A   | N/A   | N/A    | N/A    | N/A    | N/A    |      |
| Number of Code Blocks per Slot         | CBs  | 1     | 1     | 1     | 1     | 1     | 1      | 2      | 2      | 2      |      |
| Number of Code Blocks per Slot         |      |       |       |       |       |       |        |        |        |        |      |
|                                        | Bits | N/A   | N/A   | N/A   | N/A   | N/A   | N/A    | N/A    | N/A    | N/A    |      |
| Number of Code Blocks per Slot         | Bits | 5184  | 8208  | 11016 | 14040 | 16848 | 22896  | 28728  | 34992  | 46872  | 5    |
| Bit rate averaged over 1 frame         | Mbps | 2.734 | 4.202 | 5.726 | 7.181 | 8.486 | 11.750 | 14.810 | 17.857 | 23.950 | 24   |

Additional parameters are specified in Table A.3.1-1 and Table A.3.2.1-1.  
If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).  
BCH block is transmitted in slot #0 of each frame  
is slot index per frame

**Table A.3.2.2-3 Fixed reference channel for receiver requirements (SCS 60 kHz, FDD, QPSK 1/3)**

| Parameter                           | Unit | Value |       |       |       |       |        |        |        |        |        |
|-------------------------------------|------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|
| Channel bandwidth                   | MHz  | 10    | 15    | 20    | 25    | 30    | 40     | 50     | 60     | 80     | 90     |
| Channel configuration <sup>μ</sup>  |      | 2     | 2     | 2     | 2     | 2     | 2      | 2      | 2      | 2      | 2      |
| Resource blocks                     |      | 11    | 18    | 24    | 31    | 38    | 51     | 65     | 79     | 107    | 127    |
| Per resource block                  |      | 12    | 12    | 12    | 12    | 12    | 12     | 12     | 12     | 12     | 12     |
| SSBs per Frame                      |      | 36    | 36    | 36    | 36    | 36    | 36     | 36     | 36     | 36     | 36     |
|                                     |      | 4     | 4     | 4     | 4     | 4     | 4      | 4      | 4      | 4      | 4      |
| For TBS Determination               |      | 64QAM |       |       |       |       |        |        |        |        |        |
|                                     |      | QPSK  | QPSK  | QPSK  | QPSK  | QPSK  | QPSK   | QPSK   | QPSK   | QPSK   | QPSK   |
| Coding Rate                         |      | 1/3   | 1/3   | 1/3   | 1/3   | 1/3   | 1/3    | 1/3    | 1/3    | 1/3    | 1/3    |
| Number of HARQ transmissions        |      | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      |
| Information Bit Payload per Slot    |      |       |       |       |       |       |        |        |        |        |        |
| 2,3                                 | Bits | N/A   | N/A   | N/A   | N/A   | N/A   | N/A    | N/A    | N/A    | N/A    | N/A    |
| 4, ...,39                           | Bits | 736   | 1192  | 1608  | 2024  | 2472  | 3368   | 4224   | 5120   | 6912   | 7808   |
| Check CRC                           | Bits | 16    | 16    | 16    | 16    | 16    | 16     | 24     | 24     | 24     | 24     |
| Layers                              |      | 2     | 2     | 2     | 2     | 2     | 2      | 1      | 1      | 1      | 1      |
| Number of Code Blocks per Slot      |      |       |       |       |       |       |        |        |        |        |        |
| 2,3                                 | CBs  | N/A   | N/A   | N/A   | N/A   | N/A   | N/A    | N/A    | N/A    | N/A    | N/A    |
| 4, ...,39                           | CBs  | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      |
| Channel Bits per Slot               |      |       |       |       |       |       |        |        |        |        |        |
| 2,3                                 | Bits | N/A   | N/A   | N/A   | N/A   | N/A   | N/A    | N/A    | N/A    | N/A    | N/A    |
| 4, ...,39                           | Bits | 2376  | 3888  | 5184  | 6696  | 8208  | 11016  | 14040  | 17064  | 23112  | 26112  |
| Average input averaged over 1 frame | Mbps | 2.650 | 4.291 | 5.789 | 7.286 | 8.899 | 12.125 | 15.206 | 18.432 | 24.883 | 28.119 |

ditional parameters are specified in Table A.3.1-1 and Table A.3.2.1-1.

more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).

If more than one code block is present, an additional /PBCH block is transmitted in slot #0 of each frame

where  $i$  is slot index per frame

### A.3.2.3 FRC for maximum input level for 64QAM

**Table A.3.2.3-1 Fixed reference channel for maximum input level receiver requirements (SCS 15 kHz, FDD, 64QAM)**

| Parameter                                                                                                                                       | Unit | Value  |        |        |        |        |        |        |         |
|-------------------------------------------------------------------------------------------------------------------------------------------------|------|--------|--------|--------|--------|--------|--------|--------|---------|
| Channel bandwidth                                                                                                                               | MHz  | 5      | 10     | 15     | 20     | 25     | 30     | 40     | 50      |
| Subcarrier spacing                                                                                                                              | kHz  | 15     | 15     | 15     | 15     | 15     | 15     | 15     | 15      |
| Subcarrier spacing configuration $\mu$                                                                                                          |      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0       |
| Allocated resource blocks                                                                                                                       |      | 25     | 52     | 79     | 106    | 133    | 160    | 216    | 270     |
| Subcarriers per resource block                                                                                                                  |      | 12     | 12     | 12     | 12     | 12     | 12     | 12     | 12      |
| Allocated slots per Frame                                                                                                                       |      | 8      | 8      | 8      | 8      | 8      | 8      | 8      | 8       |
| MCS Index                                                                                                                                       |      | 24     | 24     | 24     | 24     | 24     | 24     | 24     | 24      |
| MCS Table for TBS determination                                                                                                                 |      | 64QAM  |        |        |        |        |        |        |         |
| Modulation                                                                                                                                      |      | 64 QAM | 64 QAM | 64 QAM | 64 QAM | 64 QAM | 64 QAM | 64 QAM | 64 QAM  |
| Target Coding Rate                                                                                                                              |      | 3/4    | 3/4    | 3/4    | 3/4    | 3/4    | 3/4    | 3/4    | 3/4     |
| Maximum number of HARQ transmissions                                                                                                            |      | 1      | 1      | 1      | 1      | 1      | 1      | 1      | 1       |
| <b>Information Bit Payload per Slot</b>                                                                                                         |      |        |        |        |        |        |        |        |         |
| For Slots 0,1                                                                                                                                   | Bits | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A     |
| For Slots 2,3,4,5,6,7,8,9                                                                                                                       | Bits | 12296  | 25608  | 38936  | 52224  | 64552  | 77896  | 106576 | 131176  |
| Transport block CRC                                                                                                                             | Bits | 24     | 24     | 24     | 24     | 24     | 24     | 24     | 24      |
| LDPC base graph                                                                                                                                 |      | 1      | 1      | 1      | 1      | 1      | 1      | 1      | 1       |
| <b>Number of Code Blocks per Slot</b>                                                                                                           |      |        |        |        |        |        |        |        |         |
| For Slot 0,1                                                                                                                                    | CBs  | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A     |
| For Slots 2,3,4,5,6,7,8,9                                                                                                                       | CBs  | 2      | 4      | 5      | 7      | 8      | 10     | 13     | 16      |
| <b>Binary Channel Bits per Slot</b>                                                                                                             |      |        |        |        |        |        |        |        |         |
| For Slot 0,1                                                                                                                                    | Bits | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A     |
| For Slots 2,3,4,5,6,7,8,9                                                                                                                       | Bits | 16200  | 33696  | 51192  | 68688  | 86184  | 103680 | 139968 | 174960  |
| Max. Throughput averaged over 1 frame                                                                                                           | Mbps | 9.837  | 20.486 | 31.149 | 41.779 | 51.642 | 62.317 | 85.261 | 104.941 |
| NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.2.1-1.                                                               |      |        |        |        |        |        |        |        |         |
| NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). |      |        |        |        |        |        |        |        |         |
| NOTE 3: SS/PBCH block is transmitted in slot 0 of each frame                                                                                    |      |        |        |        |        |        |        |        |         |
| NOTE 4: Slot i is slot index per frame                                                                                                          |      |        |        |        |        |        |        |        |         |



Table A.3.2.3-2 Fixed reference channel for maximum input level receiver requirements (SCS 30 kHz, FDD, 64QAM)

| Parameter                                                                                                                                                                                                                                                                                                                                      | Unit | Value  |        |        |        |        |        |             |             |             |             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------|--------|--------|--------|--------|--------|-------------|-------------|-------------|-------------|
| Channel bandwidth                                                                                                                                                                                                                                                                                                                              | MHz  | 10     | 15     | 20     | 25     | 30     | 40     | 50          | 60          | 80          | 100         |
| Subcarrier spacing configuration $\mu$                                                                                                                                                                                                                                                                                                         |      | 1      | 1      | 1      | 1      | 1      | 1      | 1           | 1           | 1           | 1           |
| Allocated resource blocks                                                                                                                                                                                                                                                                                                                      |      | 24     | 38     | 51     | 65     | 78     | 106    | 133         | 162         | 217         | 273         |
| Subcarriers per resource block                                                                                                                                                                                                                                                                                                                 |      | 12     | 12     | 12     | 12     | 12     | 12     | 12          | 12          | 12          | 12          |
| Allocated slots per Frame                                                                                                                                                                                                                                                                                                                      |      | 17     | 17     | 17     | 17     | 17     | 17     | 17          | 17          | 17          | 17          |
| MCS Index                                                                                                                                                                                                                                                                                                                                      |      | 24     | 24     | 24     | 24     | 24     | 24     | 24          | 24          | 24          | 24          |
| MCS Table for TBS determination                                                                                                                                                                                                                                                                                                                |      | 64QAM  |        |        |        |        |        |             |             |             |             |
| Modulation                                                                                                                                                                                                                                                                                                                                     |      | 64 QAM | 64 QAM | 64 QAM | 64 QAM | 64 QAM | 64 QAM | 64 QAM      | 64 QAM      | 64 QAM      | 64 QAM      |
| Target Coding Rate                                                                                                                                                                                                                                                                                                                             |      | 3/4    | 3/4    | 3/4    | 3/4    | 3/4    | 3/4    | 3/4         | 3/4         | 3/4         | 3/4         |
| Maximum number of HARQ transmissions                                                                                                                                                                                                                                                                                                           |      | 1      | 1      | 1      | 1      | 1      | 1      | 1           | 1           | 1           | 1           |
| <b>Information Bit Payload per Slot</b>                                                                                                                                                                                                                                                                                                        |      |        |        |        |        |        |        |             |             |             |             |
| For Slots 0,1,2                                                                                                                                                                                                                                                                                                                                | Bits | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A         | N/A         | N/A         | N/A         |
| For Slots 3,...,19                                                                                                                                                                                                                                                                                                                             | Bits | 11784  | 18432  | 25104  | 31752  | 37896  | 52224  | 64552       | 79896       | 106576      | 135296      |
| Transport block CRC                                                                                                                                                                                                                                                                                                                            | Bits | 24     | 24     | 24     | 24     | 24     | 24     | 24          | 24          | 24          | 24          |
| LDPC base graph                                                                                                                                                                                                                                                                                                                                |      | 1      | 1      | 1      | 1      | 1      | 1      | 1           | 1           | 1           | 1           |
| <b>Number of Code Blocks per Slot</b>                                                                                                                                                                                                                                                                                                          |      |        |        |        |        |        |        |             |             |             |             |
| For Slot2 0,1,2                                                                                                                                                                                                                                                                                                                                | CBs  | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A         | N/A         | N/A         | N/A         |
| For Slots 3,...,19                                                                                                                                                                                                                                                                                                                             | CBs  | 2      | 3      | 3      | 4      | 5      | 7      | 8           | 10          | 13          | 17          |
| <b>Binary Channel Bits per Slot</b>                                                                                                                                                                                                                                                                                                            |      |        |        |        |        |        |        |             |             |             |             |
| For Slots 0,1,2                                                                                                                                                                                                                                                                                                                                | Bits | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A         | N/A         | N/A         | N/A         |
| For Slots 3,...,19                                                                                                                                                                                                                                                                                                                             | Bits | 15552  | 24624  | 33048  | 42120  | 50544  | 68688  | 86184       | 104976      | 140616      | 176904      |
| Max. Throughput averaged over 1 frame                                                                                                                                                                                                                                                                                                          | Mbps | 20.033 | 31.334 | 42.677 | 53.978 | 64.423 | 88.781 | 109.73<br>8 | 135.82<br>3 | 181.17<br>9 | 230.00<br>3 |
| NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.2.1-1.<br>NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).<br>NOTE 3: SS/PBCH block is transmitted in slot 0 of each frame<br>NOTE 4: Slot i is slot index per frame |      |        |        |        |        |        |        |             |             |             |             |

Table A.3.2.3-3 Fixed Reference Channel for Maximum input level receiver requirements (SCS 60 kHz, FDD, 64QAM)

| Parameter                                                                                                                                       | Unit | Value  |        |        |        |        |        |         |         |         |         |
|-------------------------------------------------------------------------------------------------------------------------------------------------|------|--------|--------|--------|--------|--------|--------|---------|---------|---------|---------|
| Channel bandwidth                                                                                                                               | MHz  | 10     | 15     | 20     | 25     | 30     | 40     | 50      | 60      | 80      | 100     |
| Subcarrier spacing configuration $\mu$                                                                                                          |      | 2      | 2      | 2      | 2      | 2      | 2      | 2       | 2       | 2       | 2       |
| Allocated resource blocks                                                                                                                       |      | 11     | 18     | 24     | 31     | 38     | 51     | 65      | 79      | 107     | 135     |
| Subcarriers per resource block                                                                                                                  |      | 12     | 12     | 12     | 12     | 12     | 12     | 12      | 12      | 12      | 12      |
| Allocated slots per Frame                                                                                                                       |      | 36     | 36     | 36     | 36     | 36     | 36     | 36      | 36      | 36      | 36      |
| MCS Index                                                                                                                                       |      | 24     | 24     | 24     | 24     | 24     | 24     | 24      | 24      | 24      | 24      |
| MCS Table for TBS determination                                                                                                                 |      | 64QAM  |        |        |        |        |        |         |         |         |         |
| Modulation                                                                                                                                      |      | 64 QAM | 64 QAM | 64 QAM | 64 QAM | 64 QAM | 64 QAM | 64 QAM  | 64 QAM  | 64 QAM  | 64 QAM  |
| Target Coding Rate                                                                                                                              |      | 3/4    | 3/4    | 3/4    | 3/4    | 3/4    | 3/4    | 3/4     | 3/4     | 3/4     | 3/4     |
| Maximum number of HARQ transmissions                                                                                                            |      | 1      | 1      | 1      | 1      | 1      | 1      | 1       | 1       | 1       | 1       |
| <b>Information Bit Payload per Slot</b>                                                                                                         |      |        |        |        |        |        |        |         |         |         |         |
| For Slots 0,1,2,3                                                                                                                               | Bits | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A     | N/A     | N/A     | N/A     |
| For Slots 4,...,39                                                                                                                              | Bits | 5376   | 8712   | 11784  | 15112  | 18432  | 25104  | 31752   | 38936   | 52224   | 65576   |
| Transport block CRC                                                                                                                             | Bits | 24     | 24     | 24     | 24     | 24     | 24     | 24      | 24      | 24      | 24      |
| LDPC base graph                                                                                                                                 |      | 1      | 1      | 1      | 1      | 1      | 1      | 1       | 1       | 1       | 1       |
| <b>Number of Code Blocks per Slot</b>                                                                                                           |      |        |        |        |        |        |        |         |         |         |         |
| For Slots 0,1,2,3                                                                                                                               | CBs  | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A     | N/A     | N/A     | N/A     |
| For Slots 4,...,39                                                                                                                              | CBs  | 1      | 2      | 2      | 2      | 3      | 3      | 4       | 5       | 7       | 8       |
| <b>Binary Channel Bits per Slot</b>                                                                                                             |      |        |        |        |        |        |        |         |         |         |         |
| For Slots 0,1,2,3                                                                                                                               | Bits | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A     | N/A     | N/A     | N/A     |
| For Slots 4,...,39                                                                                                                              | Bits | 7128   | 11664  | 15552  | 20088  | 24624  | 33048  | 42120   | 51192   | 69336   | 87480   |
| Max. Throughput averaged over 1 frame                                                                                                           | Mbps | 19.354 | 31.363 | 42.422 | 54.403 | 66.355 | 90.374 | 114.307 | 140.170 | 188.006 | 236.074 |
| NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.2.1-1.                                                               |      |        |        |        |        |        |        |         |         |         |         |
| NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). |      |        |        |        |        |        |        |         |         |         |         |
| NOTE 3: SS/PBCH block is transmitted in slot #0 of each frame                                                                                   |      |        |        |        |        |        |        |         |         |         |         |
| NOTE 4: Slot i is slot index per frame                                                                                                          |      |        |        |        |        |        |        |         |         |         |         |

## A.3.2.4 FRC for maximum input level for 256 QAM

**Table A.3.2.4-1 Fixed reference channel for maximum input level receiver requirements (SCS 15 kHz, FDD, 256QAM)**

| Parameter                                                                                                                                       | Unit | Value   |         |         |         |         |         |         |         |
|-------------------------------------------------------------------------------------------------------------------------------------------------|------|---------|---------|---------|---------|---------|---------|---------|---------|
| Channel bandwidth                                                                                                                               | MHz  | 5       | 10      | 15      | 20      | 25      | 30      | 40      | 50      |
| Subcarrier spacing                                                                                                                              | kHz  | 15      | 15      | 15      | 15      | 15      | 15      | 15      | 15      |
| Subcarrier spacing configuration $\mu$                                                                                                          |      | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       |
| Allocated resource blocks                                                                                                                       |      | 25      | 52      | 79      | 106     | 133     | 160     | 216     | 270     |
| Subcarriers per resource block                                                                                                                  |      | 12      | 12      | 12      | 12      | 12      | 12      | 12      | 12      |
| Allocated slots per Frame                                                                                                                       |      | 8       | 8       | 8       | 8       | 8       | 8       | 8       | 8       |
| MCS Index                                                                                                                                       |      | 23      | 23      | 23      | 23      | 23      | 23      | 23      | 23      |
| MCS Table for TBS determination                                                                                                                 |      | 256QAM  |         |         |         |         |         |         |         |
| Modulation                                                                                                                                      |      | 256 QAM | 256 QAM | 256 QAM | 256 QAM | 256 QAM | 256 QAM | 256 QAM | 256 QAM |
| Target Coding Rate                                                                                                                              |      | 4/5     | 4/5     | 4/5     | 4/5     | 4/5     | 4/5     | 4/5     | 4/5     |
| Maximum number of HARQ transmissions                                                                                                            |      | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       |
| <b>Information Bit Payload per Slot</b>                                                                                                         |      |         |         |         |         |         |         |         |         |
| For Slots 0,1                                                                                                                                   | Bits | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     |
| For Slots 2,3,4,5,6,7,8,9                                                                                                                       | Bits | 16896   | 34816   | 53288   | 71688   | 90176   | 108552  | 143400  | 180376  |
| Transport block CRC                                                                                                                             | Bits | 24      | 24      | 24      | 24      | 24      | 24      | 24      | 24      |
| LDPC base graph                                                                                                                                 |      | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       |
| <b>Number of Code Blocks per Slot</b>                                                                                                           |      |         |         |         |         |         |         |         |         |
| For Slot 0,1                                                                                                                                    | CBs  | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     |
| For Slots 2,3,4,5,6,7,8,9                                                                                                                       | CBs  | 3       | 5       | 7       | 9       | 11      | 13      | 18      | 22      |
| <b>Binary Channel Bits per Slot</b>                                                                                                             |      |         |         |         |         |         |         |         |         |
| For Slots 0,1                                                                                                                                   | Bits | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     |
| For Slots 2,3,4,5,6,7,8,9                                                                                                                       | Bits | 21600   | 44928   | 68256   | 91584   | 114912  | 138240  | 186624  | 233280  |
| Max. Throughput averaged over 1 frame                                                                                                           | Mbps | 13.517  | 27.853  | 42.630  | 57.350  | 72.141  | 86.842  | 114.720 | 144.301 |
| NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.2.1-1.                                                               |      |         |         |         |         |         |         |         |         |
| NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). |      |         |         |         |         |         |         |         |         |
| NOTE 3: SS/PBCH block is transmitted in slot 0 of each frame                                                                                    |      |         |         |         |         |         |         |         |         |
| NOTE 4: Slot i is slot index per frame                                                                                                          |      |         |         |         |         |         |         |         |         |

Table A.3.2.4-2 Fixed reference channel for maximum input level receiver requirements (SCS 30 kHz, FDD, 256QAM)

| Parameter                                                                                                                                       | Unit | Value   |         |         |         |         |             |             |             |             |             |
|-------------------------------------------------------------------------------------------------------------------------------------------------|------|---------|---------|---------|---------|---------|-------------|-------------|-------------|-------------|-------------|
| Channel bandwidth                                                                                                                               | MHz  | 10      | 15      | 20      | 25      | 30      | 40          | 50          | 60          | 80          | 100         |
| Subcarrier spacing configuration $\mu$                                                                                                          |      | 1       | 1       | 1       | 1       | 1       | 1           | 1           | 1           | 1           | 1           |
| Allocated resource blocks                                                                                                                       |      | 24      | 38      | 51      | 65      | 78      | 106         | 133         | 162         | 217         | 273         |
| Subcarriers per resource block                                                                                                                  |      | 12      | 12      | 12      | 12      | 12      | 12          | 12          | 12          | 12          | 12          |
| Allocated slots per Frame                                                                                                                       |      | 17      | 17      | 17      | 17      | 17      | 17          | 17          | 17          | 17          | 17          |
| MCS Index                                                                                                                                       |      | 23      | 23      | 23      | 23      | 23      | 23          | 23          | 23          | 23          | 23          |
| MCS Table for TBS determination                                                                                                                 |      | 256QAM  |         |         |         |         |             |             |             |             |             |
| Modulation                                                                                                                                      |      | 256 QAM | 256 QAM | 256 QAM | 256 QAM | 256 QAM | 256 QAM     | 256 QAM     | 256 QAM     | 256 QAM     | 256 QAM     |
| Target Coding Rate                                                                                                                              |      | 4/5     | 4/5     | 4/5     | 4/5     | 4/5     | 4/5         | 4/5         | 4/5         | 4/5         | 4/5         |
| Maximum number of HARQ transmissions                                                                                                            |      | 1       | 1       | 1       | 1       | 1       | 1           | 1           | 1           | 1           | 1           |
| <b>Information Bit Payload per Slot</b>                                                                                                         |      |         |         |         |         |         |             |             |             |             |             |
| For Slots 0,1,2                                                                                                                                 | Bits | N/A     | N/A     | N/A     | N/A     | N/A     | N/A         | N/A         | N/A         | N/A         | N/A         |
| For Slots 3,...,19                                                                                                                              | Bits | 16136   | 25608   | 33816   | 44040   | 52224   | 71688       | 90176       | 108552      | 147576      | 184424      |
| Transport block CRC                                                                                                                             | Bits | 24      | 24      | 24      | 24      | 24      | 24          | 24          | 24          | 24          | 24          |
| LDPC base graph                                                                                                                                 |      | 1       | 1       | 1       | 1       | 1       | 1           | 1           | 1           | 1           | 1           |
| <b>Number of Code Blocks per Slot</b>                                                                                                           |      |         |         |         |         |         |             |             |             |             |             |
| For Slots 0,1,2                                                                                                                                 | CBs  | N/A     | N/A     | N/A     | N/A     | N/A     | N/A         | N/A         | N/A         | N/A         | N/A         |
| For Slots 3,...,19                                                                                                                              | CBs  | 2       | 4       | 5       | 6       | 7       | 9           | 11          | 13          | 18          | 22          |
| <b>Binary Channel Bits per Slot</b>                                                                                                             |      |         |         |         |         |         |             |             |             |             |             |
| For Slots 0,1,2                                                                                                                                 | Bits | N/A     | N/A     | N/A     | N/A     | N/A     | N/A         | N/A         | N/A         | N/A         | N/A         |
| For Slots 3,...,19                                                                                                                              | Bits | 20736   | 32832   | 44064   | 56160   | 67392   | 91584       | 114912      | 139968      | 187488      | 235872      |
| Max. Throughput averaged over 1 frame                                                                                                           | Mbps | 27.431  | 43.534  | 57.487  | 74.868  | 88.781  | 121.87<br>0 | 153.29<br>9 | 184.53<br>8 | 250.87<br>9 | 313.52<br>1 |
| NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.2.1-1.                                                               |      |         |         |         |         |         |             |             |             |             |             |
| NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). |      |         |         |         |         |         |             |             |             |             |             |
| NOTE 3: SS/PBCH block is transmitted in slot 0 of each frame                                                                                    |      |         |         |         |         |         |             |             |             |             |             |
| NOTE 4: Slot i is slot index per frame                                                                                                          |      |         |         |         |         |         |             |             |             |             |             |

Table A.3.2.4-3 Fixed reference channel for maximum input level receiver requirements (SCS 60 kHz, FDD, 256QAM)

| Parameter                              | Unit | Value |    |    |    |    |    |    |    |     |     |
|----------------------------------------|------|-------|----|----|----|----|----|----|----|-----|-----|
| Channel bandwidth                      | MHz  | 10    | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 80  | 100 |
| Subcarrier spacing configuration $\mu$ |      | 2     | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2   | 2   |
| Allocated resource blocks              |      | 11    | 18 | 24 | 31 | 38 | 51 | 65 | 79 | 107 | 135 |
| Subcarriers per resource block         |      | 12    | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12  | 12  |
| Allocated slots per Frame              |      | 36    | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36  | 36  |
| MCS Index                              |      | 23    | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23  | 23  |

| MCS Table for TBS determination                                                                                                                                                                                                                                                                                                                 |      | 256QAM     |            |            |            |            |             |             |             |             |             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|-------------|
| Modulation                                                                                                                                                                                                                                                                                                                                      |      | 256<br>QAM | 256<br>QAM | 256<br>QAM | 256<br>QAM | 256<br>QAM | 256<br>QAM  | 256<br>QAM  | 256<br>QAM  | 256<br>QAM  | 256<br>QAM  |
| Target Coding Rate                                                                                                                                                                                                                                                                                                                              |      | 4/5        | 4/5        | 4/5        | 4/5        | 4/5        | 4/5         | 4/5         | 4/5         | 4/5         | 4/5         |
| Maximum number of HARQ transmissions                                                                                                                                                                                                                                                                                                            |      | 1          | 1          | 1          | 1          | 1          | 1           | 1           | 1           | 1           | 1           |
| <b>Information Bit Payload per Slot</b>                                                                                                                                                                                                                                                                                                         |      |            |            |            |            |            |             |             |             |             |             |
| For Slots 0,1,2,3                                                                                                                                                                                                                                                                                                                               | Bits | N/A        | N/A        | N/A        | N/A        | N/A        | N/A         | N/A         | N/A         | N/A         | N/A         |
| For Slots 4,...,39                                                                                                                                                                                                                                                                                                                              | Bits | 7424       | 12040      | 16136      | 21000      | 25608      | 33816       | 44040       | 53288       | 71688       | 90176       |
| Transport block CRC                                                                                                                                                                                                                                                                                                                             | Bits | 24         | 24         | 24         | 24         | 24         | 24          | 24          | 24          | 24          | 24          |
| LDPC base graph                                                                                                                                                                                                                                                                                                                                 |      | 1          | 1          | 1          | 1          | 1          | 1           | 1           | 1           | 1           | 1           |
| <b>Number of Code Blocks per Slot</b>                                                                                                                                                                                                                                                                                                           |      |            |            |            |            |            |             |             |             |             |             |
| For Slots 0,1,2,3                                                                                                                                                                                                                                                                                                                               | CBs  | N/A        | N/A        | N/A        | N/A        | N/A        | N/A         | N/A         | N/A         | N/A         | N/A         |
| For Slots 4,...,39                                                                                                                                                                                                                                                                                                                              | CBs  | 1          | 2          | 2          | 3          | 4          | 5           | 6           | 7           | 9           | 11          |
| <b>Binary Channel Bits per Slot</b>                                                                                                                                                                                                                                                                                                             |      |            |            |            |            |            |             |             |             |             |             |
| For Slot 0,1,2,3                                                                                                                                                                                                                                                                                                                                | Bits | N/A        | N/A        | N/A        | N/A        | N/A        | N/A         | N/A         | N/A         | N/A         | N/A         |
| For Slots 4,...,39                                                                                                                                                                                                                                                                                                                              | Bits | 9504       | 15552      | 20736      | 26784      | 32832      | 44064       | 56160       | 68256       | 92448       | 116640      |
| Max. Throughput averaged over 1 frame                                                                                                                                                                                                                                                                                                           | Mbps | 26.726     | 43.344     | 58.090     | 75.600     | 92.189     | 121.73<br>8 | 158.54<br>4 | 191.83<br>7 | 258.07<br>7 | 324.63<br>4 |
| NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.2.1-1.<br>NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).<br>NOTE 3: SS/PBCH block is transmitted in slot #0 of each frame<br>NOTE 4: Slot i is slot index per frame |      |            |            |            |            |            |             |             |             |             |             |

### A.3.2.5 FRC for maximum input level for 1024 QAM

**Table A.3.2.5-1 Fixed reference channel for maximum input level receiver requirements (SCS 15 kHz, FDD, 1024QAM)**

| Parameter                                                                                                                                       | Unit | Value    |          |          |          |          |          |          |          |
|-------------------------------------------------------------------------------------------------------------------------------------------------|------|----------|----------|----------|----------|----------|----------|----------|----------|
| Channel bandwidth                                                                                                                               | MHz  | 5        | 10       | 15       | 20       | 25       | 30       | 40       | 50       |
| Subcarrier spacing                                                                                                                              | kHz  | 15       | 15       | 15       | 15       | 15       | 15       | 15       | 15       |
| Subcarrier spacing configuration $\mu$                                                                                                          |      | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |
| Allocated resource blocks                                                                                                                       |      | 25       | 52       | 79       | 106      | 133      | 160      | 216      | 270      |
| Subcarriers per resource block                                                                                                                  |      | 12       | 12       | 12       | 12       | 12       | 12       | 12       | 12       |
| Allocated slots per Frame                                                                                                                       |      | 8        | 8        | 8        | 8        | 8        | 8        | 8        | 8        |
| MCS Index                                                                                                                                       |      | 23       | 23       | 23       | 23       | 23       | 23       | 23       | 23       |
| MCS Table for TBS determination                                                                                                                 |      | 1024QAM  |          |          |          |          |          |          |          |
| Modulation                                                                                                                                      |      | 1024 QAM | 1024 QAM | 1024 QAM | 1024 QAM | 1024 QAM | 1024 QAM | 1024 QAM | 1024 QAM |
| Target Coding Rate                                                                                                                              |      | 0.78     | 0.78     | 0.78     | 0.78     | 0.78     | 0.78     | 0.78     | 0.78     |
| Maximum number of HARQ transmissions                                                                                                            |      | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        |
| <b>Information Bit Payload per Slot</b>                                                                                                         |      |          |          |          |          |          |          |          |          |
| For Slots 0,1                                                                                                                                   | Bits | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      |
| For Slots 2,3,4,5,6,7,8,9                                                                                                                       | Bits | 21000    | 44040    | 67584    | 90176    | 112648   | 135296   | 184424   | 229576   |
| Transport block CRC                                                                                                                             | Bits | 24       | 24       | 24       | 24       | 24       | 24       | 24       | 24       |
| LDPC base graph                                                                                                                                 |      | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        |
| <b>Number of Code Blocks per Slot</b>                                                                                                           |      |          |          |          |          |          |          |          |          |
| For Slot 0,1                                                                                                                                    | CBs  | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      |
| For Slots 2,3,4,5,6,7,8,9                                                                                                                       | CBs  | 3        | 6        | 9        | 11       | 14       | 17       | 22       | 28       |
| <b>Binary Channel Bits per Slot</b>                                                                                                             |      |          |          |          |          |          |          |          |          |
| For Slots 0,1                                                                                                                                   | Bits | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      |
| For Slots 2,3,4,5,6,7,8,9                                                                                                                       | Bits | 27000    | 56160    | 85320    | 114480   | 143640   | 172800   | 233280   | 291600   |
| Max. Throughput averaged over 1 frame                                                                                                           | Mbps | 16.800   | 35.232   | 54.067   | 72.141   | 90.118   | 108.237  | 147.539  | 183.661  |
| NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.2.1-1.                                                               |      |          |          |          |          |          |          |          |          |
| NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). |      |          |          |          |          |          |          |          |          |
| NOTE 3: SS/PBCH block is transmitted in slot 0 of each frame                                                                                    |      |          |          |          |          |          |          |          |          |
| NOTE 4: Slot i is slot index per frame                                                                                                          |      |          |          |          |          |          |          |          |          |

Table A.3.2.5-2 Fixed reference channel for maximum input level receiver requirements (SCS 30 kHz, FDD, 1024QAM)

| Parameter                                                                                                                                       | Unit | Value    |          |          |          |             |             |             |             |             |             |
|-------------------------------------------------------------------------------------------------------------------------------------------------|------|----------|----------|----------|----------|-------------|-------------|-------------|-------------|-------------|-------------|
| Channel bandwidth                                                                                                                               | MHz  | 10       | 15       | 20       | 25       | 30          | 40          | 50          | 60          | 80          | 100         |
| Subcarrier spacing configuration $\mu$                                                                                                          |      | 1        | 1        | 1        | 1        | 1           | 1           | 1           | 1           | 1           | 1           |
| Allocated resource blocks                                                                                                                       |      | 24       | 38       | 51       | 65       | 78          | 106         | 133         | 162         | 217         | 273         |
| Subcarriers per resource block                                                                                                                  |      | 12       | 12       | 12       | 12       | 12          | 12          | 12          | 12          | 12          | 12          |
| Allocated slots per Frame                                                                                                                       |      | 17       | 17       | 17       | 17       | 17          | 17          | 17          | 17          | 17          | 17          |
| MCS Index                                                                                                                                       |      | 23       | 23       | 23       | 23       | 23          | 23          | 23          | 23          | 23          | 23          |
| MCS Table for TBS determination                                                                                                                 |      | 1024QAM  |          |          |          |             |             |             |             |             |             |
| Modulation                                                                                                                                      |      | 1024 QAM | 1024 QAM | 1024 QAM | 1024 QAM | 1024 QAM    | 1024 QAM    | 1024 QAM    | 1024 QAM    | 1024 QAM    | 1024 QAM    |
| Target Coding Rate                                                                                                                              |      | 0.78     | 0.78     | 0.78     | 0.78     | 0.78        | 0.78        | 0.78        | 0.78        | 0.78        | 0.78        |
| Maximum number of HARQ transmissions                                                                                                            |      | 1        | 1        | 1        | 1        | 1           | 1           | 1           | 1           | 1           | 1           |
| <b>Information Bit Payload per Slot</b>                                                                                                         |      |          |          |          |          |             |             |             |             |             |             |
| For Slots 0,1,2                                                                                                                                 | Bits | N/A      | N/A      | N/A      | N/A      | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         |
| For Slots 3,...,19                                                                                                                              | Bits | 20496    | 32264    | 43032    | 55304    | 65576       | 90176       | 112648      | 139376      | 184424      | 233608      |
| Transport block CRC                                                                                                                             | Bits | 24       | 24       | 24       | 24       | 24          | 24          | 24          | 24          | 24          | 24          |
| LDPC base graph                                                                                                                                 |      | 1        | 1        | 1        | 1        | 1           | 1           | 1           | 1           | 1           | 1           |
| <b>Number of Code Blocks per Slot</b>                                                                                                           |      |          |          |          |          |             |             |             |             |             |             |
| For Slots 0,1,2                                                                                                                                 | CBs  | N/A      | N/A      | N/A      | N/A      | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         |
| For Slots 3,...,19                                                                                                                              | CBs  | 3        | 4        | 6        | 7        | 8           | 11          | 14          | 17          | 22          | 28          |
| <b>Binary Channel Bits per Slot</b>                                                                                                             |      |          |          |          |          |             |             |             |             |             |             |
| For Slots 0,1,2                                                                                                                                 | Bits | N/A      | N/A      | N/A      | N/A      | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         |
| For Slots 3,...,19                                                                                                                              | Bits | 25920    | 41040    | 55080    | 70200    | 84240       | 114480      | 143640      | 174960      | 234360      | 294840      |
| Max. Throughput averaged over 1 frame                                                                                                           | Mbps | 34.843   | 54.849   | 73.154   | 94.017   | 111.47<br>9 | 153.29<br>9 | 191.50<br>2 | 236.93<br>9 | 313.52<br>1 | 397.13<br>4 |
| NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.2.1-1.                                                               |      |          |          |          |          |             |             |             |             |             |             |
| NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). |      |          |          |          |          |             |             |             |             |             |             |
| NOTE 3: SS/PBCH block is transmitted in slot 0 of each frame                                                                                    |      |          |          |          |          |             |             |             |             |             |             |
| NOTE 4: Slot i is slot index per frame                                                                                                          |      |          |          |          |          |             |             |             |             |             |             |

Table A.3.2.5-3 Fixed reference channel for maximum input level receiver requirements (SCS 60 kHz, FDD, 1024QAM)

| Parameter                              | Unit | Value   |    |    |    |    |    |    |    |     |     |
|----------------------------------------|------|---------|----|----|----|----|----|----|----|-----|-----|
| Channel bandwidth                      | MHz  | 10      | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 80  | 100 |
| Subcarrier spacing configuration $\mu$ |      | 2       | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2   | 2   |
| Allocated resource blocks              |      | 11      | 18 | 24 | 31 | 38 | 51 | 65 | 79 | 107 | 135 |
| Subcarriers per resource block         |      | 12      | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12  | 12  |
| Allocated slots per Frame              |      | 36      | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36  | 36  |
| MCS Index                              |      | 23      | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23  | 23  |
| MCS Table for TBS determination        |      | 1024QAM |    |    |    |    |    |    |    |     |     |

|                                                                                                                                                 |      |          |          |          |          |          |          |          |          |          |          |
|-------------------------------------------------------------------------------------------------------------------------------------------------|------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Modulation                                                                                                                                      |      | 1024 QAM | 1024 QAM | 1024 QAM | 1024 QAM | 1024 QAM | 1024 QAM | 1024 QAM | 1024 QAM | 1024 QAM | 1024 QAM |
| Target Coding Rate                                                                                                                              |      | 0.78     | 0.78     | 0.78     | 0.78     | 0.78     | 0.78     | 0.78     | 0.78     | 0.78     | 0.78     |
| Maximum number of HARQ transmissions                                                                                                            |      | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        |
| <b>Information Bit Payload per Slot</b>                                                                                                         |      |          |          |          |          |          |          |          |          |          |          |
| For Slots 0,1,2,3                                                                                                                               | Bits | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      |
| For Slots 4,...,39                                                                                                                              | Bits | 9224     | 15368    | 20496    | 26120    | 32264    | 43032    | 55304    | 67584    | 90176    | 114776   |
| Transport block CRC                                                                                                                             | Bits | 24       | 24       | 24       | 24       | 24       | 24       | 24       | 24       | 24       | 24       |
| LDPC base graph                                                                                                                                 |      | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        |
| <b>Number of Code Blocks per Slot</b>                                                                                                           |      |          |          |          |          |          |          |          |          |          |          |
| For Slots 0,1,2,3                                                                                                                               | CBs  | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      |
| For Slots 4,...,39                                                                                                                              | CBs  | 2        | 2        | 3        | 4        | 4        | 6        | 7        | 9        | 11       | 14       |
| <b>Binary Channel Bits per Slot</b>                                                                                                             |      |          |          |          |          |          |          |          |          |          |          |
| For Slot 0,1,2,3                                                                                                                                | Bits | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      |
| For Slots 4,...,39                                                                                                                              | Bits | 11880    | 19440    | 25920    | 33480    | 41040    | 55080    | 70200    | 85320    | 115560   | 145800   |
| Max. Throughput averaged over 1 frame                                                                                                           | Mbps | 33.206   | 55.325   | 73.786   | 94.032   | 116.150  | 154.915  | 199.094  | 243.302  | 324.634  | 413.194  |
| NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.2.1-1.                                                               |      |          |          |          |          |          |          |          |          |          |          |
| NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). |      |          |          |          |          |          |          |          |          |          |          |
| NOTE 3: SS/PBCH block is transmitted in slot #0 of each frame                                                                                   |      |          |          |          |          |          |          |          |          |          |          |
| NOTE 4: Slot i is slot index per frame                                                                                                          |      |          |          |          |          |          |          |          |          |          |          |



## A.3.3 DL reference measurement channels for TDD

### A.3.3.1 General

**Table A.3.3.1-1 Additional reference channels parameters for TDD**

| Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                      | Value                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                      | SCS 15 kHz ( $\mu=0$ )                                                                                                                                                  | SCS 30 kHz ( $\mu=1$ )                                                                                                                                                                                                                                                                                                              | SCS 60 kHz ( $\mu=2$ )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| TDD Slot Configuration pattern (Note 1)                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                      | DDDSU                                                                                                                                                                   | 7DS2U                                                                                                                                                                                                                                                                                                                               | 14DS <sub>1</sub> S <sub>2</sub> 4U                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Special Slot Configuration (Note 2)                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                      | 10D+2G+2U                                                                                                                                                               | 6D+4G+4U                                                                                                                                                                                                                                                                                                                            | $S_1=12D+2G$ , $S_2=6G+8U$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| referenceSubcarrierSpacing                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                      | 15 kHz                                                                                                                                                                  | 30 kHz                                                                                                                                                                                                                                                                                                                              | 60 kHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| UL-DL configuration                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <i>dl-UL-TransmissionPeriodicity</i> | 5 ms                                                                                                                                                                    | 5 ms                                                                                                                                                                                                                                                                                                                                | 5 ms                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <i>nrofDownlinkSlots</i>             | 3                                                                                                                                                                       | 7                                                                                                                                                                                                                                                                                                                                   | 14                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <i>nrofDownlinkSymbols</i>           | 10                                                                                                                                                                      | 6                                                                                                                                                                                                                                                                                                                                   | 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <i>nrofUplinkSlots</i>               | 1                                                                                                                                                                       | 2                                                                                                                                                                                                                                                                                                                                   | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <i>nrofUplinkSymbols</i>             | 2                                                                                                                                                                       | 4                                                                                                                                                                                                                                                                                                                                   | 8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Number of HARQ Processes                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                      | 8                                                                                                                                                                       | 8                                                                                                                                                                                                                                                                                                                                   | 16                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| The number of slots between PDSCH and corresponding HARQ-ACK information (Note 3)                                                                                                                                                                                                                                                                                                                                                                                                  |                                      | $K1 = 4$ if $\text{mod}(i,5) = 0$<br>$K1 = 3$ if $\text{mod}(i,5) = 1$<br>$K1 = 2$ if $\text{mod}(i,5) = 2$<br>where $i$ is slot index per frame; $i = \{0, \dots, 9\}$ | $K1 = 8$ if $\text{mod}(i,10) = 0$<br>$K1 = 7$ if $\text{mod}(i,10) = 1$<br>$K1 = 6$ if $\text{mod}(i,10) = 2$<br>$K1 = 5$ if $\text{mod}(i,10) = 3$<br>$K1 = 4$ if $\text{mod}(i,10) = 4$<br>$K1 = 3$ if $\text{mod}(i,10) = 5$<br>$K1 = 2$ if $\text{mod}(i,10) = 6$<br>where $i$ is slot index per frame; $i = \{0, \dots, 19\}$ | $K1 = 13$ if $\text{mod}(i,20) = 2$<br>$K1 = 12$ if $\text{mod}(i,20) = 3$<br>$K1 = 11$ if $\text{mod}(i,20) = 4$<br>$K1 = 10$ if $\text{mod}(i,20) = 5$<br>$K1 = 9$ if $\text{mod}(i,20) = 6$<br>$K1 = 8$ if $\text{mod}(i,20) = 7$<br>$K1 = 7$ if $\text{mod}(i,20) = 8$<br>$K1 = 6$ if $\text{mod}(i,20) = 9$<br>$K1 = 6$ if $\text{mod}(i,20) = 10$<br>$K1 = 6$ if $\text{mod}(i,20) = 11$<br>$K1 = 6$ if $\text{mod}(i,20) = 12$<br>$K1 = 6$ if $\text{mod}(i,20) = 13$<br>where $i$ is slot index per frame; $i = \{0, \dots, 39\}$ |
| NOTE 1: D denotes a slot with all DL symbols; S denotes a slot with a mix of DL, UL and guard symbols; U denotes a slot with all UL symbols. The field is for information.<br>NOTE 2: D, G, U denote DL, guard and UL symbols, respectively. The field is for information.<br>NOTE 3: $i$ is the slot index per frame.<br>NOTE 4: A -2ms or +3ms time offset to the NR configuration pattern relative to the E-UTRA UL-DL configuration must be apply in the TDD intra-band EN-DC. |                                      |                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

### A.3.3.2 FRC for receiver requirements for QPSK

**Table A.3.3.2-1 Fixed reference channel for receiver requirements (SCS 15 kHz, TDD, QPSK 1/3)**

| Parameter                              | Unit | Value |      |      |      |      |      |      |      |
|----------------------------------------|------|-------|------|------|------|------|------|------|------|
| Channel bandwidth                      | MHz  | 5     | 10   | 15   | 20   | 25   | 30   | 40   | 50   |
| Subcarrier spacing                     | kHz  | 15    | 15   | 15   | 15   | 15   | 15   | 15   | 15   |
| Subcarrier spacing configuration $\mu$ |      | 0     | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Allocated resource blocks              |      | 25    | 52   | 79   | 106  | 133  | 160  | 216  | 270  |
| Subcarriers per resource block         |      | 12    | 12   | 12   | 12   | 12   | 12   | 12   | 12   |
| Allocated slots per Frame              |      | 4     | 4    | 4    | 4    | 4    | 4    | 4    | 4    |
| MCS Index                              |      | 4     | 4    | 4    | 4    | 4    | 4    | 4    | 4    |
| MCS Table for TBS determination        |      | 64QAM |      |      |      |      |      |      |      |
| Modulation                             |      | QPSK  | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK |
| Target Coding Rate                     |      | 1/3   | 1/3  | 1/3  | 1/3  | 1/3  | 1/3  | 1/3  | 1/3  |
| Maximum number of HARQ transmissions   |      | 1     | 1    | 1    | 1    | 1    | 1    | 1    | 1    |

| Information Bit Payload per Slot                                                                                                                |      |       |       |       |       |       |       |       |       |
|-------------------------------------------------------------------------------------------------------------------------------------------------|------|-------|-------|-------|-------|-------|-------|-------|-------|
| For Slots 0,1,3,4,8,9                                                                                                                           | Bits | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   |
| For Slots 2,5,6,7                                                                                                                               | Bits | 1672  | 3368  | 5120  | 6912  | 8712  | 10504 | 14088 | 17424 |
| Transport block CRC                                                                                                                             | Bits | 16    | 16    | 24    | 24    | 24    | 24    | 24    | 24    |
| LDPC base graph                                                                                                                                 |      | 2     | 2     | 1     | 1     | 1     | 1     | 1     | 1     |
| Number of Code Blocks per Slot                                                                                                                  |      |       |       |       |       |       |       |       |       |
| For Slots 0,1,3,4,8,9                                                                                                                           | CBs  | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   |
| For Slots 2,5,6,7                                                                                                                               | CBs  | 1     | 1     | 1     | 1     | 2     | 2     | 2     | 3     |
| Binary Channel Bits per Slot                                                                                                                    |      |       |       |       |       |       |       |       |       |
| For Slots 0,1,3,4,8,9                                                                                                                           | Bits | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   |
| For Slots 2,5,6,7                                                                                                                               | Bits | 5400  | 11232 | 17064 | 22896 | 28728 | 34560 | 46656 | 58320 |
| Max. Throughput averaged over 1 frame                                                                                                           | Mbps | 0.669 | 1.347 | 2.048 | 2.765 | 3.485 | 4.202 | 5.635 | 6.970 |
| NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.3.1-1.                                                               |      |       |       |       |       |       |       |       |       |
| NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). |      |       |       |       |       |       |       |       |       |
| NOTE 3: SS/PBCH block is transmitted in slot 0 of each frame                                                                                    |      |       |       |       |       |       |       |       |       |
| NOTE 4: Slot i is slot index per frame                                                                                                          |      |       |       |       |       |       |       |       |       |

Table A.3.3.2-2 Fixed reference channel for receiver requirements (SCS 30 kHz, TDD, QPSK 1/3)

| Parameter                                                                                                                                       | Unit | Value |       |       |       |       |       |       |        |        |        |        |
|-------------------------------------------------------------------------------------------------------------------------------------------------|------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|
| Channel bandwidth                                                                                                                               | MHz  | 10    | 15    | 20    | 25    | 30    | 40    | 50    | 60     | 70     | 80     | 100    |
| Subcarrier spacing configuration $\mu$                                                                                                          |      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      |
| Allocated resource blocks                                                                                                                       |      | 24    | 38    | 51    | 65    | 78    | 106   | 133   | 162    | 162    | 217    | 273    |
| Subcarriers per resource block                                                                                                                  |      | 12    | 12    | 12    | 12    | 12    | 12    | 12    | 12     | 12     | 12     | 12     |
| Allocated slots per Frame                                                                                                                       |      | 11    | 11    | 11    | 11    | 11    | 11    | 11    | 11     | 13     | 11     | 11     |
| MCS Index                                                                                                                                       |      | 4     | 4     | 4     | 4     | 4     | 4     | 4     | 4      | 4      | 4      | 4      |
| MCS Table for TBS determination                                                                                                                 |      | 64QAM |       |       |       |       |       |       |        |        |        |        |
| Modulation                                                                                                                                      |      | QPSK  | QPSK  | QPSK  | QPSK  | QPSK  | QPSK  | QPSK  | QPSK   | QPSK   | QPSK   | QPSK   |
| Target Coding Rate                                                                                                                              |      | 1/3   | 1/3   | 1/3   | 1/3   | 1/3   | 1/3   | 1/3   | 1/3    | 1/3    | 1/3    | 1/3    |
| Maximum number of HARQ transmissions                                                                                                            |      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      |
| <b>Information Bit Payload per Slot</b>                                                                                                         |      |       |       |       |       |       |       |       |        |        |        |        |
| For Slots 0,1,2 and Slot i, if $\text{mod}(i, 10) = \{7,8,9\}$ for i from $\{0, \dots, 19\}$                                                    | Bits | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A    | N/A    | N/A    | N/A    |
| For Slot i, if $\text{mod}(i, 10) = \{0,1,2,3,4,5,6\}$ for i from $\{3, \dots, 19\}$                                                            | Bits | 1608  | 2472  | 3368  | 4224  | 4992  | 6912  | 8712  | 10504  | 12296  | 14088  | 17928  |
| Transport block CRC                                                                                                                             | Bits | 16    | 16    | 16    | 24    | 24    | 24    | 24    | 24     | 24     | 24     | 24     |
| LDPC base graph                                                                                                                                 |      | 2     | 2     | 2     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      |
| <b>Number of Code Blocks per Slot</b>                                                                                                           |      |       |       |       |       |       |       |       |        |        |        |        |
| For Slots 0,1,2 and Slot i, if $\text{mod}(i, 10) = \{7,8,9\}$ for i from $\{0, \dots, 19\}$                                                    | CBs  | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A    | N/A    | N/A    | N/A    |
| For Slot i, if $\text{mod}(i, 10) = \{0,1,2,3,4,5,6\}$ for i from $\{3, \dots, 19\}$                                                            | CBs  | 1     | 1     | 1     | 1     | 1     | 1     | 2     | 2      | 2      | 2      | 3      |
| <b>Binary Channel Bits per Slot</b>                                                                                                             |      |       |       |       |       |       |       |       |        |        |        |        |
| For Slots 0,1,2 and Slot i, if $\text{mod}(i, 10) = \{7,8,9\}$ for i from $\{0, \dots, 19\}$                                                    | Bits | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A    | N/A    | N/A    | N/A    |
| For Slot i, if $\text{mod}(i, 10) = \{0,1,2,3,4,5,6\}$ for i from $\{3, \dots, 19\}$                                                            | Bits | 5184  | 8208  | 11016 | 14040 | 16848 | 22896 | 28728 | 34992  | 40824  | 46872  | 58968  |
| Max. Throughput averaged over 1 frame                                                                                                           | Mbps | 1.769 | 2.719 | 3.705 | 4.646 | 5.491 | 7.603 | 9.583 | 11.554 | 13.526 | 15.497 | 19.721 |
| NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.3.1-1.                                                               |      |       |       |       |       |       |       |       |        |        |        |        |
| NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). |      |       |       |       |       |       |       |       |        |        |        |        |
| NOTE 3: SS/PBCH block is transmitted in slot #0 of each frame                                                                                   |      |       |       |       |       |       |       |       |        |        |        |        |
| NOTE 4: Slot i is slot index per frame                                                                                                          |      |       |       |       |       |       |       |       |        |        |        |        |

Table A.3.3.2-3 Fixed reference channel for receiver requirements (SCS 60 kHz, TDD, QPSK 1/3)

| Parameter                                                                                                                                       | Unit | Value |       |       |       |       |       |        |        |        |        |        |
|-------------------------------------------------------------------------------------------------------------------------------------------------|------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|
| Channel bandwidth                                                                                                                               | MHz  | 10    | 15    | 20    | 25    | 30    | 40    | 50     | 60     | 70     | 80     | 100    |
| Subcarrier spacing configuration $\mu$                                                                                                          |      | 2     | 2     | 2     | 2     | 2     | 2     | 2      | 2      | 2      | 2      | 2      |
| Allocated resource blocks                                                                                                                       |      | 11    | 18    | 24    | 31    | 38    | 51    | 65     | 79     | 93     | 107    | 135    |
| Subcarriers per resource block                                                                                                                  |      | 12    | 12    | 12    | 12    | 12    | 12    | 12     | 12     | 12     | 12     | 12     |
| Allocated slots per Frame                                                                                                                       |      | 24    | 24    | 24    | 24    | 24    | 24    | 24     | 24     | 26     | 24     | 24     |
| MCS Index                                                                                                                                       |      | 4     | 4     | 4     | 4     | 4     | 4     | 4      | 4      | 4      | 4      | 4      |
| MCS Table for TBS determination                                                                                                                 |      | 64QAM |       |       |       |       |       |        |        |        |        |        |
| Modulation                                                                                                                                      |      | QPSK  | QPSK  | QPSK  | QPSK  | QPSK  | QPSK  | QPSK   | QPSK   | QPSK   | QPSK   | QPSK   |
| Target Coding Rate                                                                                                                              |      | 1/3   | 1/3   | 1/3   | 1/3   | 1/3   | 1/3   | 1/3    | 1/3    | 1/3    | 1/3    | 1/3    |
| Maximum number of HARQ transmissions                                                                                                            |      | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      |
| <b>Information Bit Payload per Slot</b>                                                                                                         |      |       |       |       |       |       |       |        |        |        |        |        |
| For Slots 0,1,2,3 and Slot i, if $\text{mod}(i, 20) = \{14,15,16,17,18,19\}$ for i from $\{0,...,39\}$                                          | Bits | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A    | N/A    | N/A    | N/A    | N/A    |
| For Slot i, if $\text{mod}(i, 20) = \{0,..., 13\}$ for i from $\{4,...,39\}$                                                                    | Bits | 736   | 1192  | 1608  | 2024  | 2472  | 3368  | 4224   | 5120   | 6016   | 6912   | 8712   |
| Transport block CRC                                                                                                                             | Bits | 16    | 16    | 16    | 16    | 16    | 16    | 24     | 24     | 24     | 24     | 24     |
| LDPC base graph                                                                                                                                 |      | 2     | 2     | 2     | 2     | 2     | 2     | 1      | 1      | 1      | 1      | 1      |
| <b>Number of Code Blocks per Slot</b>                                                                                                           |      |       |       |       |       |       |       |        |        |        |        |        |
| For Slots 0,1,2,3 and Slot i, if $\text{mod}(i, 20) = \{14,15,16,17,18,19\}$ for i from $\{0,...,39\}$                                          | CBs  | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A    | N/A    | N/A    | N/A    | N/A    |
| For Slot i, if $\text{mod}(i, 20) = \{0,..., 13\}$ for i from $\{4,...,39\}$                                                                    | CBs  | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 2      |
| <b>Binary Channel Bits per Slot</b>                                                                                                             |      |       |       |       |       |       |       |        |        |        |        |        |
| For Slots 0,1,2,3 and Slot i, if $\text{mod}(i, 20) = \{14,15,16,17,18,19\}$ for i from $\{0,...,39\}$                                          | Bits | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A    | N/A    | N/A    | N/A    | N/A    |
| For Slot i, if $\text{mod}(i, 20) = \{0,...,13\}$ for i from $\{4,...,39\}$                                                                     | Bits | 2376  | 3888  | 5184  | 6696  | 8208  | 11016 | 14040  | 17064  | 20088  | 23112  | 29160  |
| Max. Throughput averaged over 1 frame                                                                                                           | Mbps | 1.766 | 2.861 | 3.859 | 4.858 | 5.933 | 8.083 | 10.138 | 12.288 | 14.438 | 16.589 | 20.909 |
| NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.3.1-1.                                                               |      |       |       |       |       |       |       |        |        |        |        |        |
| NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). |      |       |       |       |       |       |       |        |        |        |        |        |
| NOTE 3: SS/PBCH block is transmitted in slot #0 of each frame                                                                                   |      |       |       |       |       |       |       |        |        |        |        |        |
| NOTE 4: Slot i is slot index per frame                                                                                                          |      |       |       |       |       |       |       |        |        |        |        |        |

### A.3.3.3 FRC for maximum input level for 64QAM

**Table A.3.3.3-1 Fixed reference channel for maximum input level receiver requirements (SCS 15 kHz, TDD, 64QAM)**

| Parameter                                                                                                                                       | Unit | Value  |        |        |        |        |        |        |        |
|-------------------------------------------------------------------------------------------------------------------------------------------------|------|--------|--------|--------|--------|--------|--------|--------|--------|
| Channel bandwidth                                                                                                                               | MHz  | 5      | 10     | 15     | 20     | 25     | 30     | 40     | 50     |
| Subcarrier spacing                                                                                                                              | kHz  | 15     | 15     | 15     | 15     | 15     | 15     | 15     | 15     |
| Subcarrier spacing configuration $\mu$                                                                                                          |      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |
| Allocated resource blocks                                                                                                                       |      | 25     | 52     | 79     | 106    | 133    | 160    | 216    | 270    |
| Subcarriers per resource block                                                                                                                  |      | 12     | 12     | 12     | 12     | 12     | 12     | 12     | 12     |
| Allocated slots per Frame                                                                                                                       |      | 4      | 4      | 4      | 4      | 4      | 4      | 4      | 4      |
| MCS Index                                                                                                                                       |      | 24     | 24     | 24     | 24     | 24     | 24     | 24     | 24     |
| MCS Table for TBS determination                                                                                                                 |      | 64QAM  |        |        |        |        |        |        |        |
| Modulation                                                                                                                                      |      | 64 QAM | 64 QAM | 64 QAM | 64 QAM | 64 QAM | 64 QAM | 64 QAM | 64 QAM |
| Target Coding Rate                                                                                                                              |      | 3/4    | 3/4    | 3/4    | 3/4    | 3/4    | 3/4    | 3/4    | 3/4    |
| Maximum number of HARQ transmissions                                                                                                            |      | 1      | 1      | 1      | 1      | 1      | 1      | 1      | 1      |
| <b>Information Bit Payload per Slot</b>                                                                                                         |      |        |        |        |        |        |        |        |        |
| For Slots 0,1,3,4,8,9                                                                                                                           | Bits | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    |
| For Slots 2,5,6,7                                                                                                                               | Bits | 12296  | 25608  | 38936  | 52224  | 64552  | 77896  | 106576 | 131176 |
| Transport block CRC                                                                                                                             | Bits | 24     | 24     | 24     | 24     | 24     | 24     | 24     | 24     |
| LDPC base graph                                                                                                                                 |      | 1      | 1      | 1      | 1      | 1      | 1      | 1      | 1      |
| <b>Number of Code Blocks per Slot</b>                                                                                                           |      |        |        |        |        |        |        |        |        |
| For Slots 0,1,3,4,8,9                                                                                                                           | CBs  | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    |
| For Slots 2,5,6,7                                                                                                                               | CBs  | 2      | 4      | 5      | 7      | 8      | 10     | 13     | 16     |
| <b>Binary Channel Bits per Slot</b>                                                                                                             |      |        |        |        |        |        |        |        |        |
| For Slots 0,1,3,4,8,9                                                                                                                           | Bits | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    |
| For Slots 2,5,6,7                                                                                                                               | Bits | 16200  | 33696  | 51192  | 68688  | 86184  | 103680 | 139968 | 174960 |
| Max. Throughput averaged over 1 frame                                                                                                           | Mbps | 4.918  | 10.243 | 15.574 | 20.890 | 20.890 | 31.158 | 42.630 | 52.470 |
| NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.3.1-1.                                                               |      |        |        |        |        |        |        |        |        |
| NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). |      |        |        |        |        |        |        |        |        |
| NOTE 3: SS/PBCH block is transmitted in slot 0 of each frame                                                                                    |      |        |        |        |        |        |        |        |        |
| NOTE 4: Slot i is slot index per frame                                                                                                          |      |        |        |        |        |        |        |        |        |

Table A.3.3.3-2 Fixed reference channel for maximum input level receiver requirements (SCS 30 kHz, TDD, 64QAM)

| Parameter                                                                                                                                       | Unit | Value  |        |        |        |        |        |        |        |        |             |             |
|-------------------------------------------------------------------------------------------------------------------------------------------------|------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------------|-------------|
| Channel bandwidth                                                                                                                               | MHz  | 10     | 15     | 20     | 25     | 30     | 40     | 50     | 60     | 70     | 80          | 100         |
| Subcarrier spacing configuration $\mu$                                                                                                          |      | 1      | 1      | 1      | 1      | 1      | 1      | 1      | 1      | 1      | 1           | 1           |
| Allocated resource blocks                                                                                                                       |      | 24     | 38     | 51     | 65     | 78     | 106    | 133    | 162    | 189    | 217         | 273         |
| Subcarriers per resource block                                                                                                                  |      | 12     | 12     | 12     | 12     | 12     | 12     | 12     | 12     | 12     | 12          | 12          |
| Allocated slots per Frame                                                                                                                       |      | 11     | 11     | 11     | 11     | 11     | 11     | 11     | 11     | 13     | 11          | 11          |
| MCS Index                                                                                                                                       |      | 24     | 24     | 24     | 24     | 24     | 24     | 24     | 24     | 24     | 24          | 24          |
| MCS Table for TBS determination                                                                                                                 |      | 64QAM  |        |        |        |        |        |        |        |        |             |             |
| Modulation                                                                                                                                      |      | 64 QAM | 64 QAM | 64 QAM | 64 QAM | 64 QAM | 64 QAM | 64 QAM | 64 QAM | 64 QAM | 64 QAM      | 64 QAM      |
| Target Coding Rate                                                                                                                              |      | 3/4    | 3/4    | 3/4    | 3/4    | 3/4    | 3/4    | 3/4    | 3/4    | 3/4    | 3/4         | 3/4         |
| Maximum number of HARQ transmissions                                                                                                            |      | 1      | 1      | 1      | 1      | 1      | 1      | 1      | 1      | 1      | 1           | 1           |
| <b>Information Bit Payload per Slot</b>                                                                                                         |      |        |        |        |        |        |        |        |        |        |             |             |
| For Slots 0,1,2 and Slot i, if $\text{mod}(i, 10) = \{7,8,9\}$ for i from $\{0, \dots, 19\}$                                                    | Bits | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A         | N/A         |
| For Slot i, if $\text{mod}(i, 10) = \{0,1,2,3,4,5,6\}$ for i from $\{3, \dots, 19\}$                                                            | Bits | 11784  | 18432  | 25104  | 31752  | 37896  | 52224  | 64552  | 79896  | 92200  | 106576      | 135296      |
| Transport block CRC                                                                                                                             | Bits | 24     | 24     | 24     | 24     | 24     | 24     | 24     | 24     | 24     | 24          | 24          |
| LDPC base graph                                                                                                                                 |      | 1      | 1      | 1      | 1      | 1      | 1      | 1      | 1      | 1      | 1           | 1           |
| <b>Number of Code Blocks per Slot</b>                                                                                                           |      |        |        |        |        |        |        |        |        |        |             |             |
| For Slots 0,1,2 and Slot i, if $\text{mod}(i, 10) = \{7,8,9\}$ for i from $\{0, \dots, 19\}$                                                    | CBs  | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A         | N/A         |
| For Slot i, if $\text{mod}(i, 10) = \{0,1,2,3,4,5,6\}$ for i from $\{3, \dots, 19\}$                                                            | CBs  | 2      | 3      | 3      | 4      | 5      | 7      | 8      | 10     | 11     | 13          | 17          |
| <b>Binary Channel Bits per Slot</b>                                                                                                             |      |        |        |        |        |        |        |        |        |        |             |             |
| For Slots 0,1,2 and Slot i, if $\text{mod}(i, 10) = \{7,8,9\}$ for i from $\{0, \dots, 19\}$                                                    | Bits | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A         | N/A         |
| For Slot i, if $\text{mod}(i, 10) = \{0,1,2,3,4,5,6\}$ for i from $\{3, \dots, 19\}$                                                            | Bits | 15552  | 24624  | 33048  | 42120  | 50544  | 68688  | 86184  | 104976 | 122472 | 140616      | 176904      |
| Max. Throughput averaged over 1 frame                                                                                                           | Mbps | 12.962 | 20.275 | 27.614 | 34.927 | 41.686 | 57.446 | 71.007 | 87.886 | 101.42 | 117.23<br>4 | 148.82<br>6 |
| NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.3.1-1.                                                               |      |        |        |        |        |        |        |        |        |        |             |             |
| NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). |      |        |        |        |        |        |        |        |        |        |             |             |
| NOTE 3: SS/PBCH block is transmitted in slot #0 of each frame                                                                                   |      |        |        |        |        |        |        |        |        |        |             |             |
| NOTE 4: Slot i is slot index per frame                                                                                                          |      |        |        |        |        |        |        |        |        |        |             |             |

Table A.3.3.3-3. Fixed reference channel for maximum input level receiver requirements (SCS 60 kHz, TDD, 64QAM)

| Parameter                                                                                                                                       | Unit | Value  |        |        |        |        |        |        |        |        |             |             |
|-------------------------------------------------------------------------------------------------------------------------------------------------|------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------------|-------------|
| Channel bandwidth                                                                                                                               | MHz  | 10     | 15     | 20     | 25     | 30     | 40     | 50     | 60     | 70     | 80          | 100         |
| Subcarrier spacing configuration $\mu$                                                                                                          |      | 2      | 2      | 2      | 2      | 2      | 2      | 2      | 2      | 2      | 2           | 2           |
| Allocated resource blocks                                                                                                                       |      | 11     | 18     | 24     | 31     | 38     | 51     | 65     | 79     | 93     | 107         | 135         |
| Subcarriers per resource block                                                                                                                  |      | 12     | 12     | 12     | 12     | 12     | 12     | 12     | 12     | 12     | 12          | 12          |
| Allocated slots per Frame                                                                                                                       |      | 24     | 24     | 24     | 24     | 24     | 24     | 24     | 24     | 26     | 24          | 24          |
| MCS Index                                                                                                                                       |      | 24     | 24     | 24     | 24     | 24     | 24     | 24     | 24     | 24     | 24          | 24          |
| MCS Table for TBS determination                                                                                                                 |      | 64QAM  |        |        |        |        |        |        |        |        |             |             |
| Modulation                                                                                                                                      |      | 64 QAM | 64 QAM | 64 QAM | 64 QAM | 64 QAM | 64 QAM | 64 QAM | 64 QAM | 64 QAM | 64 QAM      | 64 QAM      |
| Target Coding Rate                                                                                                                              |      | 3/4    | 3/4    | 3/4    | 3/4    | 3/4    | 3/4    | 3/4    | 3/4    | 3/4    | 3/4         | 3/4         |
| Maximum number of HARQ transmissions                                                                                                            |      | 1      | 1      | 1      | 1      | 1      | 1      | 1      | 1      | 1      | 1           | 1           |
| <b>Information Bit Payload per Slot</b>                                                                                                         |      |        |        |        |        |        |        |        |        |        |             |             |
| For Slots 0,1,2,3 and Slot i, if $\text{mod}(i, 20) = \{14,15,16,17,18,19\}$ for i from $\{0,...,39\}$                                          | Bits | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A         | N/A         |
| For Slot i, if $\text{mod}(i, 20) = \{0,..., 13\}$ for i from $\{4,...,39\}$                                                                    | Bits | 5376   | 8712   | 11784  | 15112  | 18432  | 25104  | 31752  | 38936  | 45096  | 52224       | 65576       |
| Transport block CRC                                                                                                                             | Bits | 24     | 24     | 24     | 24     | 24     | 24     | 24     | 24     | 24     | 24          | 24          |
| LDPC base graph                                                                                                                                 |      | 1      | 1      | 1      | 1      | 1      | 1      | 1      | 1      | 1      | 1           | 1           |
| <b>Number of Code Blocks per Slot</b>                                                                                                           |      |        |        |        |        |        |        |        |        |        |             |             |
| For Slots 0,1,2,3 and Slot i, if $\text{mod}(i, 20) = \{14,15,16,17,18,19\}$ for i from $\{0,...,39\}$                                          | CBs  | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A         | N/A         |
| For Slot i, if $\text{mod}(i, 20) = \{0,..., 13\}$ for i from $\{4,...,39\}$                                                                    | CBs  | 1      | 2      | 2      | 2      | 3      | 3      | 4      | 5      | 6      | 7           | 8           |
| <b>Binary Channel Bits per Slot</b>                                                                                                             |      |        |        |        |        |        |        |        |        |        |             |             |
| For Slots 0,1,2,3 and Slot i, if $\text{mod}(i, 20) = \{14,15,16,17,18,19\}$ for i from $\{0,...,39\}$                                          | Bits | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A         | N/A         |
| For Slot i, if $\text{mod}(i, 20) = \{0,..., 13\}$ for i from $\{4,...,39\}$                                                                    | Bits | 7128   | 11664  | 15552  | 20088  | 24624  | 33048  | 42120  | 51192  | 60264  | 69336       | 87480       |
| Max. Throughput averaged over 1 frame                                                                                                           | Mbps | 12.902 | 20.909 | 28.282 | 36.269 | 44.237 | 60.250 | 76.205 | 93.446 | 108.23 | 125.33<br>8 | 157.38<br>2 |
| NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.3.1-1.                                                               |      |        |        |        |        |        |        |        |        |        |             |             |
| NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). |      |        |        |        |        |        |        |        |        |        |             |             |
| NOTE 3: SS/PBCH block is transmitted in slot #0 of each frame                                                                                   |      |        |        |        |        |        |        |        |        |        |             |             |
| NOTE 4: Slot i is slot index per frame                                                                                                          |      |        |        |        |        |        |        |        |        |        |             |             |

## A.3.3.4 FRC for maximum input level for 256 QAM

**Table A.3.3.4-1 Fixed reference channel for maximum input level receiver requirements (SCS 15 kHz, TDD, 256QAM)**

| Parameter                                                                                                                                       | Unit | Value   |         |         |         |         |         |         |         |
|-------------------------------------------------------------------------------------------------------------------------------------------------|------|---------|---------|---------|---------|---------|---------|---------|---------|
| Channel bandwidth                                                                                                                               | MHz  | 5       | 10      | 15      | 20      | 25      | 30      | 40      | 50      |
| Subcarrier spacing                                                                                                                              | kHz  | 15      | 15      | 15      | 15      | 15      | 15      | 15      | 15      |
| Subcarrier spacing configuration $\mu$                                                                                                          |      | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       |
| Allocated resource blocks                                                                                                                       |      | 25      | 52      | 79      | 106     | 133     | 160     | 216     | 270     |
| Subcarriers per resource block                                                                                                                  |      | 12      | 12      | 12      | 12      | 12      | 12      | 12      | 12      |
| Allocated slots per Frame                                                                                                                       |      | 4       | 4       | 4       | 4       | 4       | 4       | 4       | 4       |
| MCS Index                                                                                                                                       |      | 23      | 23      | 23      | 23      | 23      | 23      | 23      | 23      |
| MCS table for TBS determination                                                                                                                 |      | 256QAM  |         |         |         |         |         |         |         |
| Modulation                                                                                                                                      |      | 256 QAM | 256 QAM | 256 QAM | 256 QAM | 256 QAM | 256 QAM | 256 QAM | 256 QAM |
| Target Coding Rate                                                                                                                              |      | 4/5     | 4/5     | 4/5     | 4/5     | 4/5     | 4/5     | 4/5     | 4/5     |
| Maximum number of HARQ transmissions                                                                                                            |      | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       |
| <b>Information Bit Payload per Slot</b>                                                                                                         |      |         |         |         |         |         |         |         |         |
| For Slots 0,1,3,4,8,9                                                                                                                           | Bits | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     |
| For Slots 2,5,6,7                                                                                                                               | Bits | 16896   | 34816   | 53288   | 71688   | 90176   | 108552  | 143400  | 180376  |
| Transport block CRC                                                                                                                             | Bits | 24      | 24      | 24      | 24      | 24      | 24      | 24      | 24      |
| LDPC base graph                                                                                                                                 |      | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       |
| <b>Number of Code Blocks per Slot</b>                                                                                                           |      |         |         |         |         |         |         |         |         |
| For Slots 0,1,3,4,8,9                                                                                                                           | CBs  | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     |
| For Slots 2,5,6,7                                                                                                                               | CBs  | 3       | 5       | 7       | 9       | 12      | 14      | 18      | 23      |
| Binary Channel Bits per Slot                                                                                                                    |      |         |         |         |         |         |         |         |         |
| For Slots 0,1,3,4,8,9                                                                                                                           | Bits | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     |
| For Slots 2,5,6,7                                                                                                                               | Bits | 21600   | 44928   | 68256   | 91584   | 114912  | 138240  | 186624  | 233280  |
| Max. Throughput averaged over 1 frame                                                                                                           | Mbps | 6.758   | 13.926  | 21.315  | 28.675  | 36.070  | 43.421  | 57.360  | 72.150  |
| NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.3.1-1.                                                               |      |         |         |         |         |         |         |         |         |
| NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). |      |         |         |         |         |         |         |         |         |
| NOTE 3: SS/PBCH block is transmitted in slot 0 of each frame                                                                                    |      |         |         |         |         |         |         |         |         |
| NOTE 4: Slot i is slot index per frame                                                                                                          |      |         |         |         |         |         |         |         |         |



Table A.3.3.4-2 Fixed Reference channel for maximum input level receiver requirements (SCS 30 kHz, TDD, 256QAM)

| Parameter                                                                                                                                       | Unit | Value   |         |         |         |         |         |         |         |         |         |         |
|-------------------------------------------------------------------------------------------------------------------------------------------------|------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Channel bandwidth                                                                                                                               | MHz  | 10      | 15      | 20      | 25      | 30      | 40      | 50      | 60      | 70      | 80      | 100     |
| Subcarrier spacing configuration $\mu$                                                                                                          |      | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       |
| Allocated resource blocks                                                                                                                       |      | 24      | 38      | 51      | 65      | 78      | 106     | 133     | 162     | 189     | 217     | 273     |
| Subcarriers per resource block                                                                                                                  |      | 12      | 12      | 12      | 12      | 12      | 12      | 12      | 12      | 12      | 12      | 12      |
| Allocated slots per Frame                                                                                                                       |      | 11      | 11      | 11      | 11      | 11      | 11      | 11      | 11      | 13      | 11      | 11      |
| MCS Index                                                                                                                                       |      | 23      | 23      | 23      | 23      | 23      | 23      | 23      | 23      | 23      | 23      | 23      |
| MCS Table for TBS determination                                                                                                                 |      | 256QAM  |         |         |         |         |         |         |         |         |         |         |
| Modulation                                                                                                                                      |      | 256 QAM | 256 QAM | 256 QAM | 256 QAM | 256 QAM | 256 QAM | 256 QAM | 256 QAM | 256 QAM | 256 QAM | 256 QAM |
| Target Coding Rate                                                                                                                              |      | 4/5     | 4/5     | 4/5     | 4/5     | 4/5     | 4/5     | 4/5     | 4/5     | 4/5     | 4/5     | 4/5     |
| Maximum number of HARQ transmissions                                                                                                            |      | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       |
| <b>Information Bit Payload per Slot</b>                                                                                                         |      |         |         |         |         |         |         |         |         |         |         |         |
| For Slots 0,1,2 and Slot i, if mod(i, 10) = {7,8,9} for i from {0,...,19}                                                                       | Bits | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     |
| For Slot i, if mod(i, 10) = {0,1,2,3,4,5,6} for i from {3,...,19}                                                                               | Bits | 16136   | 25608   | 33816   | 44040   | 52224   | 71688   | 90176   | 108552  | 127080  | 147576  | 184424  |
| Transport block CRC                                                                                                                             | Bits | 24      | 24      | 24      | 24      | 24      | 24      | 24      | 24      | 24      | 24      | 24      |
| LDPC base graph                                                                                                                                 |      | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       |
| <b>Number of Code Blocks per Slot</b>                                                                                                           |      |         |         |         |         |         |         |         |         |         |         |         |
| For Slots 0,1,2 and Slot i, if mod(i, 10) = {7,8,9} for i from {0,...,19}                                                                       | CBs  | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     |
| For Slot i, if mod(i, 10) = {0,1,2,3,4,5,6} for i from {3,...,19}                                                                               | CBs  | 1       | 1       | 1       | 1       | 1       | 1       | 2       | 2       | 2       | 2       | 3       |
| <b>Binary Channel Bits per Slot</b>                                                                                                             |      |         |         |         |         |         |         |         |         |         |         |         |
| For Slots 0,1,2 and Slot i, if mod(i, 10) = {7,8,9} for i from {0,...,19}                                                                       | Bits | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     |
| For Slot i, if mod(i, 10) = {0,1,2,3,4,5,6} for i from {3,...,19}                                                                               | Bits | 20736   | 32832   | 44064   | 56160   | 67392   | 91584   | 114912  | 139968  | 163296  | 187488  | 235872  |
| Max. Throughput averaged over 1 frame                                                                                                           | Mbps | 17.750  | 28.169  | 37.198  | 48.444  | 57.446  | 78.857  | 99.194  | 119.407 | 139.788 | 162.334 | 202.866 |
| NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.3.1-1.                                                               |      |         |         |         |         |         |         |         |         |         |         |         |
| NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). |      |         |         |         |         |         |         |         |         |         |         |         |
| NOTE 3: SS/PBCH block is transmitted in slot #0 of each frame                                                                                   |      |         |         |         |         |         |         |         |         |         |         |         |
| NOTE 4: Slot i is slot index per frame                                                                                                          |      |         |         |         |         |         |         |         |         |         |         |         |

Table A.3.3.4-3 Fixed reference channel for maximum input level receiver requirements (SCS 60 kHz, TDD, 256QAM)

| Parameter                                                                                                                                       | Unit | Value   |         |         |         |         |         |             |             |             |             |             |
|-------------------------------------------------------------------------------------------------------------------------------------------------|------|---------|---------|---------|---------|---------|---------|-------------|-------------|-------------|-------------|-------------|
| Channel bandwidth                                                                                                                               | MHz  | 10      | 15      | 20      | 25      | 30      | 40      | 50          | 60          | 70          | 80          | 100         |
| Subcarrier spacing configuration $\mu$                                                                                                          |      | 2       | 2       | 2       | 2       | 2       | 2       | 2           | 2           | 2           | 2           | 2           |
| Allocated resource blocks                                                                                                                       |      | 11      | 18      | 24      | 31      | 38      | 51      | 65          | 79          | 93          | 107         | 135         |
| Subcarriers per resource block                                                                                                                  |      | 12      | 12      | 12      | 12      | 12      | 12      | 12          | 12          | 12          | 12          | 12          |
| Allocated slots per Frame                                                                                                                       |      | 24      | 24      | 24      | 24      | 24      | 24      | 24          | 24          | 26          | 24          | 24          |
| MCS Index                                                                                                                                       |      | 23      | 23      | 23      | 23      | 23      | 23      | 23          | 23          | 23          | 23          | 23          |
| MCS Table for TBS determination                                                                                                                 |      | 256QAM  |         |         |         |         |         |             |             |             |             |             |
| Modulation                                                                                                                                      |      | 256 QAM | 256 QAM | 256 QAM | 256 QAM | 256 QAM | 256 QAM | 256 QAM     | 256 QAM     | 256 QAM     | 256 QAM     | 256 QAM     |
| Target Coding Rate                                                                                                                              |      | 4/5     | 4/5     | 4/5     | 4/5     | 4/5     | 4/5     | 4/5         | 4/5         | 4/5         | 4/5         | 4/5         |
| Maximum number of HARQ transmissions                                                                                                            |      | 1       | 1       | 1       | 1       | 1       | 1       | 1           | 1           | 1           | 1           | 1           |
| <b>Information Bit Payload per Slot</b>                                                                                                         |      |         |         |         |         |         |         |             |             |             |             |             |
| For Slots 0,1,2,3 and Slot i, if $\text{mod}(i, 20) = \{14,15,16,17,18,19\}$ for i from $\{0,...,39\}$                                          | Bits | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     | N/A         | N/A         | N/A         | N/A         | N/A         |
| For Slot i, if $\text{mod}(i, 20) = \{0,..., 13\}$ for i from $\{4,...,39\}$                                                                    | Bits | 7424    | 12040   | 16136   | 21000   | 25608   | 33816   | 44040       | 53288       | 62504       | 71688       | 90176       |
| Transport block CRC                                                                                                                             | Bits | 24      | 24      | 24      | 24      | 24      | 24      | 24          | 24          | 24          | 24          | 24          |
| LDPC base graph                                                                                                                                 |      | 1       | 1       | 1       | 1       | 1       | 1       | 1           | 1           | 1           | 1           | 1           |
| <b>Number of Code Blocks per Slot</b>                                                                                                           |      |         |         |         |         |         |         |             |             |             |             |             |
| For Slots 0,1,2,3 and Slot i, if $\text{mod}(i, 20) = \{14,15,16,17,18,19\}$ for i from $\{0,...,39\}$                                          | CBs  | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     | N/A         | N/A         | N/A         | N/A         | N/A         |
| For Slot i, if $\text{mod}(i, 20) = \{0,..., 13\}$ for i from $\{4,...,39\}$                                                                    | CBs  | 1       | 2       | 3       | 3       | 4       | 5       | 6           | 7           | 8           | 9           | 12          |
| <b>Binary Channel Bits per Slot</b>                                                                                                             |      |         |         |         |         |         |         |             |             |             |             |             |
| For Slots 0,1,2,3 and Slot i, if $\text{mod}(i, 20) = \{14,15,16,17,18,19\}$ for i from $\{0,...,39\}$                                          | Bits | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     | N/A         | N/A         | N/A         | N/A         | N/A         |
| For Slot i, if $\text{mod}(i, 20) = \{0,..., 13\}$ for i from $\{4,...,39\}$                                                                    | Bits | 9504    | 15552   | 20736   | 26784   | 32832   | 44064   | 56160       | 68256       | 80352       | 92448       | 116640      |
| Max. Throughput averaged over 1 frame                                                                                                           | Mbps | 17.818  | 28.896  | 38.726  | 50.400  | 61.459  | 81.158  | 105.69<br>6 | 127.89<br>1 | 150.01<br>0 | 172.05<br>1 | 216.42<br>2 |
| NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.3.1-1.                                                               |      |         |         |         |         |         |         |             |             |             |             |             |
| NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). |      |         |         |         |         |         |         |             |             |             |             |             |
| NOTE 3: SS/PBCH block is transmitted in slot #0 of each frame                                                                                   |      |         |         |         |         |         |         |             |             |             |             |             |
| NOTE 4: Slot i is slot index per frame                                                                                                          |      |         |         |         |         |         |         |             |             |             |             |             |

### A.3.3.5 FRC for maximum input level for 1024 QAM

**Table A.3.3.5-1 Fixed reference channel for maximum input level receiver requirements (SCS 15 kHz, TDD, 1024QAM)**

| Parameter                                                                                                                                       | Unit | Value    |          |          |          |          |          |          |          |
|-------------------------------------------------------------------------------------------------------------------------------------------------|------|----------|----------|----------|----------|----------|----------|----------|----------|
| Channel bandwidth                                                                                                                               | MHz  | 5        | 10       | 15       | 20       | 25       | 30       | 40       | 50       |
| Subcarrier spacing                                                                                                                              | kHz  | 15       | 15       | 15       | 15       | 15       | 15       | 15       | 15       |
| Subcarrier spacing configuration $\mu$                                                                                                          |      | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |
| Allocated resource blocks                                                                                                                       |      | 25       | 52       | 79       | 106      | 133      | 160      | 216      | 270      |
| Subcarriers per resource block                                                                                                                  |      | 12       | 12       | 12       | 12       | 12       | 12       | 12       | 12       |
| Allocated slots per Frame                                                                                                                       |      | 4        | 4        | 4        | 4        | 4        | 4        | 4        | 4        |
| MCS Index                                                                                                                                       |      | 23       | 23       | 23       | 23       | 23       | 23       | 23       | 23       |
| MCS table for TBS determination                                                                                                                 |      | 1024QAM  |          |          |          |          |          |          |          |
| Modulation                                                                                                                                      |      | 1024 QAM | 1024 QAM | 1024 QAM | 1024 QAM | 1024 QAM | 1024 QAM | 1024 QAM | 1024 QAM |
| Target Coding Rate                                                                                                                              |      | 0.78     | 0.78     | 0.78     | 0.78     | 0.78     | 0.78     | 0.78     | 0.78     |
| Maximum number of HARQ transmissions                                                                                                            |      | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        |
| <b>Information Bit Payload per Slot</b>                                                                                                         |      |          |          |          |          |          |          |          |          |
| For Slots 0,1,3,4,8,9                                                                                                                           | Bits | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      |
| For Slots 2,5,6,7                                                                                                                               | Bits | 21000    | 44040    | 67584    | 90176    | 112648   | 135296   | 184424   | 229576   |
| Transport block CRC                                                                                                                             | Bits | 24       | 24       | 24       | 24       | 24       | 24       | 24       | 24       |
| LDPC base graph                                                                                                                                 |      | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        |
| <b>Number of Code Blocks per Slot</b>                                                                                                           |      |          |          |          |          |          |          |          |          |
| For Slots 0,1,3,4,8,9                                                                                                                           | CBs  | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      |
| For Slots 2,5,6,7                                                                                                                               | CBs  | 3        | 6        | 9        | 11       | 14       | 17       | 22       | 28       |
| Binary Channel Bits per Slot                                                                                                                    |      |          |          |          |          |          |          |          |          |
| For Slots 0,1,3,4,8,9                                                                                                                           | Bits | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      |
| For Slots 2,5,6,7                                                                                                                               | Bits | 27000    | 56160    | 85320    | 114480   | 143640   | 172800   | 233280   | 291600   |
| Max. Throughput averaged over 1 frame                                                                                                           | Mbps | 8.400    | 17.616   | 27.034   | 36.070   | 45.059   | 54.118   | 73.770   | 91.830   |
| NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.3.1-1.                                                               |      |          |          |          |          |          |          |          |          |
| NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). |      |          |          |          |          |          |          |          |          |
| NOTE 3: SS/PBCH block is transmitted in slot 0 of each frame                                                                                    |      |          |          |          |          |          |          |          |          |
| NOTE 4: Slot i is slot index per frame                                                                                                          |      |          |          |          |          |          |          |          |          |

Table A.3.3.5-2 Fixed Reference channel for maximum input level receiver requirements (SCS 30 kHz, TDD, 1024QAM)

| Parameter                                                                                                                                       | Unit | Value    |          |          |          |          |          |          |          |          |          |          |
|-------------------------------------------------------------------------------------------------------------------------------------------------|------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Channel bandwidth                                                                                                                               | MHz  | 10       | 15       | 20       | 25       | 30       | 40       | 50       | 60       | 70       | 80       | 100      |
| Subcarrier spacing configuration $\mu$                                                                                                          |      | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        |
| Allocated resource blocks                                                                                                                       |      | 24       | 38       | 51       | 65       | 78       | 106      | 133      | 162      | 189      | 217      | 273      |
| Subcarriers per resource block                                                                                                                  |      | 12       | 12       | 12       | 12       | 12       | 12       | 12       | 12       | 12       | 12       | 12       |
| Allocated slots per Frame                                                                                                                       |      | 11       | 11       | 11       | 11       | 11       | 11       | 11       | 11       | 13       | 11       | 11       |
| MCS Index                                                                                                                                       |      | 23       | 23       | 23       | 23       | 23       | 23       | 23       | 23       | 23       | 23       | 23       |
| MCS Table for TBS determination                                                                                                                 |      |          |          |          |          |          |          |          |          |          |          |          |
| Modulation                                                                                                                                      |      | 1024 QAM | 1024 QAM | 1024 QAM | 1024 QAM | 1024 QAM | 1024 QAM | 1024 QAM | 1024 QAM | 1024 QAM | 1024 QAM | 1024 QAM |
| Target Coding Rate                                                                                                                              |      | 0.78     | 0.78     | 0.78     | 0.78     | 0.78     | 0.78     | 0.78     | 0.78     | 0.78     | 0.78     | 0.78     |
| Maximum number of HARQ transmissions                                                                                                            |      | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        |
| <b>Information Bit Payload per Slot</b>                                                                                                         |      |          |          |          |          |          |          |          |          |          |          |          |
| For Slots 0,1,2 and Slot i, if $\text{mod}(i, 10) = \{7,8,9\}$ for i from $\{0, \dots, 19\}$                                                    | Bits | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      |
| For Slot i, if $\text{mod}(i, 10) = \{0,1,2,3,4,5,6\}$ for i from $\{3, \dots, 19\}$                                                            | Bits | 20496    | 32264    | 43032    | 55304    | 65576    | 90176    | 112648   | 139376   | 159800   | 184424   | 233608   |
| Transport block CRC                                                                                                                             | Bits | 24       | 24       | 24       | 24       | 24       | 24       | 24       | 24       | 24       | 24       | 24       |
| LDPC base graph                                                                                                                                 |      | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        | 1        |
| <b>Number of Code Blocks per Slot</b>                                                                                                           |      |          |          |          |          |          |          |          |          |          |          |          |
| For Slots 0,1,2 and Slot i, if $\text{mod}(i, 10) = \{7,8,9\}$ for i from $\{0, \dots, 19\}$                                                    | CBs  | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      |
| For Slot i, if $\text{mod}(i, 10) = \{0,1,2,3,4,5,6\}$ for i from $\{3, \dots, 19\}$                                                            | CBs  | 3        | 4        | 6        | 7        | 8        | 11       | 14       | 17       | 19       | 22       | 28       |
| <b>Binary Channel Bits per Slot</b>                                                                                                             |      |          |          |          |          |          |          |          |          |          |          |          |
| For Slots 0,1,2 and Slot i, if $\text{mod}(i, 10) = \{7,8,9\}$ for i from $\{0, \dots, 19\}$                                                    | Bits | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      | N/A      |
| For Slot i, if $\text{mod}(i, 10) = \{0,1,2,3,4,5,6\}$ for i from $\{3, \dots, 19\}$                                                            | Bits | 25920    | 41040    | 55080    | 70200    | 84240    | 114480   | 143640   | 174960   | 204120   | 234360   | 294840   |
| Max. Throughput averaged over 1 frame                                                                                                           | Mbps | 22.546   | 35.490   | 47.335   | 60.834   | 72.134   | 99.194   | 123.913  | 153.314  | 175.868  | 202.866  | 256.969  |
| NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.3.1-1.                                                               |      |          |          |          |          |          |          |          |          |          |          |          |
| NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). |      |          |          |          |          |          |          |          |          |          |          |          |
| NOTE 3: SS/PBCH block is transmitted in slot #0 of each frame                                                                                   |      |          |          |          |          |          |          |          |          |          |          |          |
| NOTE 4: Slot i is slot index per frame                                                                                                          |      |          |          |          |          |          |          |          |          |          |          |          |

Table A.3.3.5-3 Fixed reference channel for maximum input level receiver requirements (SCS 60 kHz, TDD, 1024QAM)

| Parameter                              | Unit | Value |    |    |    |    |    |    |    |    |    |     |
|----------------------------------------|------|-------|----|----|----|----|----|----|----|----|----|-----|
| Channel bandwidth                      | MHz  | 10    | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 100 |
| Subcarrier spacing configuration $\mu$ |      | 2     | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2   |

|                                                                                                                                                 |      |          |          |          |          |          |             |             |             |             |             |             |
|-------------------------------------------------------------------------------------------------------------------------------------------------|------|----------|----------|----------|----------|----------|-------------|-------------|-------------|-------------|-------------|-------------|
| Allocated resource blocks                                                                                                                       |      | 11       | 18       | 24       | 31       | 38       | 51          | 65          | 79          | 93          | 107         | 135         |
| Subcarriers per resource block                                                                                                                  |      | 12       | 12       | 12       | 12       | 12       | 12          | 12          | 12          | 12          | 12          | 12          |
| Allocated slots per Frame                                                                                                                       |      | 24       | 24       | 24       | 24       | 24       | 24          | 24          | 24          | 26          | 24          | 24          |
| MCS Index                                                                                                                                       |      | 23       | 23       | 23       | 23       | 23       | 23          | 23          | 23          | 23          | 23          | 23          |
| MCS Table for TBS determination                                                                                                                 |      | 1024QAM  |          |          |          |          |             |             |             |             |             |             |
| Modulation                                                                                                                                      |      | 1024 QAM | 1024 QAM | 1024 QAM | 1024 QAM | 1024 QAM | 1024 QAM    | 1024 QAM    | 1024 QAM    | 1024 QAM    | 1024 QAM    | 1024 QAM    |
| Target Coding Rate                                                                                                                              |      | 0.78     | 0.78     | 0.78     | 0.78     | 0.78     | 0.78        | 0.78        | 0.78        | 0.78        | 0.78        | 0.78        |
| Maximum number of HARQ transmissions                                                                                                            |      | 1        | 1        | 1        | 1        | 1        | 1           | 1           | 1           | 1           | 1           | 1           |
| <b>Information Bit Payload per Slot</b>                                                                                                         |      |          |          |          |          |          |             |             |             |             |             |             |
| For Slots 0,1,2,3 and Slot i, if $\text{mod}(i, 20) = \{14,15,16,17,18,19\}$ for i from $\{0,...,39\}$                                          | Bits | N/A      | N/A      | N/A      | N/A      | N/A      | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         |
| For Slot i, if $\text{mod}(i, 20) = \{0,..., 13\}$ for i from $\{4,...,39\}$                                                                    | Bits | 9224     | 15368    | 20496    | 26120    | 32264    | 43032       | 55304       | 67584       | 79896       | 90176       | 114776      |
| Transport block CRC                                                                                                                             | Bits | 24       | 24       | 24       | 24       | 24       | 24          | 24          | 24          | 24          | 24          | 24          |
| LDPC base graph                                                                                                                                 |      | 1        | 1        | 1        | 1        | 1        | 1           | 1           | 1           | 1           | 1           | 1           |
| <b>Number of Code Blocks per Slot</b>                                                                                                           |      |          |          |          |          |          |             |             |             |             |             |             |
| For Slots 0,1,2,3 and Slot i, if $\text{mod}(i, 20) = \{14,15,16,17,18,19\}$ for i from $\{0,...,39\}$                                          | CBs  | N/A      | N/A      | N/A      | N/A      | N/A      | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         |
| For Slot i, if $\text{mod}(i, 20) = \{0,..., 13\}$ for i from $\{4,...,39\}$                                                                    | CBs  | 2        | 2        | 3        | 4        | 4        | 6           | 7           | 9           | 10          | 11          | 14          |
| <b>Binary Channel Bits per Slot</b>                                                                                                             |      |          |          |          |          |          |             |             |             |             |             |             |
| For Slots 0,1,2,3 and Slot i, if $\text{mod}(i, 20) = \{14,15,16,17,18,19\}$ for i from $\{0,...,39\}$                                          | Bits | N/A      | N/A      | N/A      | N/A      | N/A      | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         |
| For Slot i, if $\text{mod}(i, 20) = \{0,..., 13\}$ for i from $\{4,...,39\}$                                                                    | Bits | 11880    | 19440    | 25920    | 33480    | 41040    | 55080       | 70200       | 85320       | 100440      | 115560      | 145800      |
| Max. Throughput averaged over 1 frame                                                                                                           | Mbps | 22.138   | 36.883   | 49.190   | 62.688   | 77.434   | 103.27<br>7 | 132.73<br>0 | 162.20<br>2 | 191.75<br>0 | 216.42<br>2 | 275.46<br>2 |
| NOTE 1: Additional parameters are specified in Table A.3.1-1 and Table A.3.3.1-1.                                                               |      |          |          |          |          |          |             |             |             |             |             |             |
| NOTE 2: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). |      |          |          |          |          |          |             |             |             |             |             |             |
| NOTE 3: SS/PBCH block is transmitted in slot #0 of each frame                                                                                   |      |          |          |          |          |          |             |             |             |             |             |             |
| NOTE 4: Slot i is slot index per frame                                                                                                          |      |          |          |          |          |          |             |             |             |             |             |             |

## A.4 CSI reference measurement channels

## A.5 OFDMA Channel Noise Generator (OCNG)

### A.5.1 OCNG Patterns for FDD

#### A.5.1.1 OCNG FDD pattern 1: Generic OCNG FDD Pattern for all unused REs

**Table A.5.1.1-1: OP.1 FDD: Generic OCNG FDD Pattern for all unused REs**

| <b>OCNG Appliance</b><br><b>OCNG Parameters</b>                                                                                                                                                                                                                 | <b>Control Region</b><br><b>(Core Set)</b>     | <b>Data Region</b>                                                                                     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| Resources allocated                                                                                                                                                                                                                                             | All unused REs (Note 1)                        | All unused REs (Note 2)                                                                                |
| Structure                                                                                                                                                                                                                                                       | PDCCH                                          | PDSCH                                                                                                  |
| Content                                                                                                                                                                                                                                                         | Uncorrelated pseudo random QPSK modulated data | Uncorrelated pseudo random QPSK modulated data                                                         |
| Transmission scheme for multiple antennas ports transmission                                                                                                                                                                                                    | Single Tx port transmission                    | Spatial multiplexing using any precoding matrix with dimensions same as the precoding matrix for PDSCH |
| Subcarrier Spacing                                                                                                                                                                                                                                              | Same as for RMC PDCCH in the active BWP        | Same as for RMC PDSCH in the active BWP                                                                |
| Power Level                                                                                                                                                                                                                                                     | Same as for RMC PDCCH                          | Same as for RMC PDSCH                                                                                  |
| NOTE 1: All unused REs in the active CORESETS appointed by the search spaces in use.<br>NOTE 2: Unused available REs refer to REs in PRBs not allocated for any physical channels, CORESETS, synchronization signals or reference signals in channel bandwidth. |                                                |                                                                                                        |

### A.5.2 OCNG Patterns for TDD

#### A.5.2.1 OCNG TDD pattern 1: Generic OCNG TDD Pattern for all unused REs

**Table A.5.2.1-1: OP.1 TDD: Generic OCNG TDD Pattern for all unused REs**

| <b>OCNG Appliance</b><br><b>OCNG Parameters</b>                                                                                                                                                                                                                 | <b>Control Region</b><br><b>(Core Set)</b>     | <b>Data Region</b>                                                                                     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| Resources allocated                                                                                                                                                                                                                                             | All unused REs (Note 1)                        | All unused REs (Note 2)                                                                                |
| Structure                                                                                                                                                                                                                                                       | PDCCH                                          | PDSCH                                                                                                  |
| Content                                                                                                                                                                                                                                                         | Uncorrelated pseudo random QPSK modulated data | Uncorrelated pseudo random QPSK modulated data                                                         |
| Transmission scheme for multiple antennas ports transmission                                                                                                                                                                                                    | Single Tx port transmission                    | Spatial multiplexing using any precoding matrix with dimensions same as the precoding matrix for PDSCH |
| Subcarrier Spacing                                                                                                                                                                                                                                              | Same as for RMC PDCCH in the active BWP        | Same as for RMC PDSCH in the active BWP                                                                |
| Power Level                                                                                                                                                                                                                                                     | Same as for RMC PDCCH                          | Same as for RMC PDSCH                                                                                  |
| NOTE 1: All unused REs in the active CORESETS appointed by the search spaces in use.<br>NOTE 2: Unused available REs refer to REs in PRBs not allocated for any physical channels, CORESETS, synchronization signals or reference signals in channel bandwidth. |                                                |                                                                                                        |

## A.6 Void

## A.7 V2X reference measurement channels

### A.7.1 General

The algorithm for determining the payload size  $A$  is as follows; given a desired coding rate  $R$  and radio block allocation  $NRB$

1. Calculate the RE number of 2nd stage SCI  $Q\_SCI2^A$  that can be transmitted in a given sub-frame, where in order to make sure that the code-rate of 2-A is approximate to SCI 1-A, a beta offset is selected based on MCS, and vacant resource elements  $\gamma$  value is determined based on  $NRB$  and DMRS frequency density.
2. Transport Block Size is determined according to clause 8.1.3.2 of TS 38.214 [13] based on Table A.7.1-1.
3. Calculate Binary Channel Bits per Slot for PSSCH as below

Binary Channel Bits per Slot =  $(NRB * \text{Subcarriers per resource block} * \text{CP-OFDM symbols per slot} - \text{DMRS resource REs} - \text{PSCCH resource Res} - Q\_SCI2^A) * Q_m$

Where  $Q_m$  is the modulation order corresponding to MCS.

In Table A.7.1-1 Common reference channel parameters are listed the Sidelink reference measurement channels specified in annexes A.7.2 to A.7.6.

**Table A.7.1-1: Common reference channel parameters**

| Parameter                              | Value                             | remark                                                                                                          |
|----------------------------------------|-----------------------------------|-----------------------------------------------------------------------------------------------------------------|
| Number of HARQ Processes               | 1                                 |                                                                                                                 |
| Channel state                          | AWGN                              |                                                                                                                 |
| Subcarriers per resource block         | 12                                |                                                                                                                 |
| sl-PSSCH-DMRS-TimePatternList          | 2                                 | symbol4 and symbol 10 in each slot<br>FDMed with PSSCH within DMRS symbol<br>Frequency density is $\frac{1}{2}$ |
| CP-OFDM symbols per slot (Note1)       | 12 for all slots                  | Excluding the first OFDM symbol in one SL slot used for AGC                                                     |
| PSCCH resource                         | 10 PRBs, 3 symbols in time domain |                                                                                                                 |
| Slot number in 10ms                    | $10 * 2^\mu$                      | $\mu = 0,1,2$ for 15kHz, 30kHz, 60kHz                                                                           |
| PT-RS                                  | disable                           |                                                                                                                 |
| CSI-RS                                 | disable                           |                                                                                                                 |
| x-overhead                             | 0                                 |                                                                                                                 |
| PSFCH period                           | 0                                 |                                                                                                                 |
| 2 <sup>nd</sup> stage SCI payload size | 59                                | 35bits SCI-2A + 24bits CRC                                                                                      |
| Redundancy Version                     | RV0                               | For channel coding                                                                                              |
| Alpha value for SCI-2                  | 1                                 |                                                                                                                 |

### A.7.2 FRC for V2X receiver requirements for QPSK

For V2X transmission over PC5, Table A.7.2-1, Table A.7.2-2 and Table A.7.2-3 are applicable for measurements on the Receiver Characteristics with the exception of Maximum input level.

**Table A.7.2-1: Fixed reference channel for V2X receiver requirements (SCS 15 kHz, QPSK)**

| Parameter          | Unit | Value          |    |    |    |    |
|--------------------|------|----------------|----|----|----|----|
| Channel bandwidth  | MHz  | 5 <sup>3</sup> | 10 | 20 | 30 | 40 |
| Subcarrier spacing | kHz  | 15             | 15 | 15 | 15 | 15 |

|                                                                                                                                                            |      |        |        |        |        |        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------|--------|--------|--------|--------|
| Subchannel size                                                                                                                                            |      | 12     | 10     | 15     | 10     | 12     |
| Allocated resource blocks                                                                                                                                  |      | 24     | 50     | 105    | 160    | 216    |
| MCS Index                                                                                                                                                  |      | 4      | 4      | 4      | 4      | 4      |
| MCS Table for TBS determination                                                                                                                            |      | 64QAM  |        |        |        |        |
| Modulation                                                                                                                                                 |      | QPSK   | QPSK   | QPSK   | QPSK   | QPSK   |
| Transport Block Size                                                                                                                                       |      | 1608   | 3624   | 7936   | 12296  | 16896  |
| Transport block CRC                                                                                                                                        | Bits | 16     | 16     | 24     | 24     | 24     |
| LDPC base graph                                                                                                                                            |      | 2      | 2      | 1      | 1      | 1      |
| Number of Code Blocks per Slot                                                                                                                             |      | 1      | 1      | 1      | 2      | 3      |
| Beta offset for 2nd stage SCI                                                                                                                              |      | 2.25   | 2.25   | 2.25   | 2.25   | 2.25   |
| $\gamma$ value when 2nd stage SCI rate match                                                                                                               |      | 7      | 1      | 1      | 1      | 1      |
| Binary Channel Bits per Slot                                                                                                                               |      | 5160   | 12036  | 26556  | 41076  | 55860  |
| Max. Throughput averaged over 100ms                                                                                                                        | Mbps | 0.1608 | 0.3624 | 0.7936 | 1.2296 | 1.6896 |
| NOTE 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).            |      |        |        |        |        |        |
| NOTE 2: $\gamma$ is the number of vacant resource elements in the resource block to which the last coded symbol of the 2 <sup>nd</sup> -stage SCI belongs. |      |        |        |        |        |        |
| NOTE 3: The CBW is only applicable for PS UE in n14.                                                                                                       |      |        |        |        |        |        |

**Table A.7.2-2: Fixed reference channel for V2X receiver requirements (SCS 30 kHz, QPSK)**

| Parameter                                                                                                                                                  | Unit | Value  |        |        |        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------|--------|--------|--------|
| Channel bandwidth                                                                                                                                          | MHz  | 10     | 20     | 30     | 40     |
| Subcarrier spacing                                                                                                                                         | kHz  | 30     | 30     | 30     | 30     |
| Subchannel size                                                                                                                                            |      | 12     | 10     | 15     | 15     |
| Allocated resource blocks                                                                                                                                  |      | 24     | 50     | 75     | 105    |
| MCS Index                                                                                                                                                  |      | 4      | 4      | 4      | 4      |
| MCS Table for TBS determination                                                                                                                            |      | 64QAM  |        |        |        |
| Modulation                                                                                                                                                 |      | QPSK   | QPSK   | QPSK   | QPSK   |
| Transport Block Size                                                                                                                                       |      | 1608   | 3624   | 5632   | 7936   |
| Transport block CRC                                                                                                                                        | Bits | 16     | 16     | 24     | 24     |
| LDPC base graph                                                                                                                                            |      | 2      | 2      | 1      | 1      |
| Number of Code Blocks per Slot                                                                                                                             |      | 1      | 1      | 1      | 1      |
| Beta offset for 2nd stage SCI                                                                                                                              |      | 2.25   | 2.25   | 2.25   | 2.25   |
| $\gamma$ value when 2nd stage SCI rate match                                                                                                               |      | 7      | 1      | 1      | 1      |
| Binary Channel Bits per Slot                                                                                                                               |      | 5160   | 12036  | 18636  | 26556  |
| Max. Throughput averaged over 100ms                                                                                                                        | Mbps | 0.3216 | 0.7248 | 1.1264 | 1.5872 |
| NOTE 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).            |      |        |        |        |        |
| NOTE 2: $\gamma$ is the number of vacant resource elements in the resource block to which the last coded symbol of the 2 <sup>nd</sup> -stage SCI belongs. |      |        |        |        |        |

**Table A.7.2-3: Fixed reference channel for V2X receiver requirements (SCS 60 kHz, QPSK)**

| Parameter                                                                                                                                       | Unit | Value  |        |        |        |
|-------------------------------------------------------------------------------------------------------------------------------------------------|------|--------|--------|--------|--------|
| Channel bandwidth                                                                                                                               | MHz  | 10     | 20     | 30     | 40     |
| Subcarrier spacing                                                                                                                              | kHz  | 60     | 60     | 60     | 60     |
| Subchannel size                                                                                                                                 |      | 10     | 12     | 12     | 10     |
| Allocated resource blocks                                                                                                                       |      | 10     | 24     | 36     | 50     |
| MCS Index                                                                                                                                       |      | 4      | 4      | 4      | 4      |
| MCS Table for TBS determination                                                                                                                 |      | 64QAM  |        |        |        |
| Modulation                                                                                                                                      |      | QPSK   | QPSK   | QPSK   | QPSK   |
| Transport Block Size                                                                                                                            |      | 456    | 1608   | 2536   | 3624   |
| Transport block CRC                                                                                                                             | Bits | 16     | 16     | 16     | 16     |
| LDPC base graph                                                                                                                                 |      | 2      | 2      | 2      | 2      |
| Number of Code Blocks per Slot                                                                                                                  |      | 1      | 1      | 1      | 1      |
| Beta offset for 2nd stage SCI                                                                                                                   |      | 2.25   | 2.25   | 2.25   | 2.25   |
| $\gamma$ value when 2nd stage SCI rate match                                                                                                    |      | 7      | 7      | 7      | 1      |
| Binary Channel Bits per Slot                                                                                                                    |      | 1464   | 5160   | 8328   | 12036  |
| Max. Throughput averaged over 100ms                                                                                                             | Mbps | 0.1824 | 0.6432 | 1.0144 | 1.4496 |
| NOTE 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). |      |        |        |        |        |



NOTE 2:  $\gamma$  is the number of vacant resource elements in the resource block to which the last coded symbol of the 2<sup>nd</sup>-stage SCI belongs.

### A.7.3 FRC for maximum input level for 64QAM

For V2X transmission over PC5, Table A.7.3-1, Table A.7.3-2 and TableA.7.3-3 are applicable for Maximum input level when the maximum modulation order is 64QAM.

**Table A.7.3-1: Fixed reference channel for V2X receiver requirements (SCS 15 kHz, 64QAM)**

| Parameter                                                                                                                                                  | Unit | Value          |        |        |        |        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------------|--------|--------|--------|--------|
| Channel bandwidth                                                                                                                                          | MHz  | 5 <sup>3</sup> | 10     | 20     | 30     | 40     |
| Subcarrier spacing                                                                                                                                         | kHz  | 15             | 15     | 15     | 15     | 15     |
| Subchannel size                                                                                                                                            |      | 12             | 10     | 15     | 10     | 12     |
| Allocated resource blocks                                                                                                                                  |      | 24             | 50     | 105    | 160    | 216    |
| MCS Index                                                                                                                                                  |      | 24             | 24     | 24     | 24     | 24     |
| MCS Table for TBS determination                                                                                                                            |      | 64QAM          |        |        |        |        |
| Modulation                                                                                                                                                 |      | 64QAM          | 64QAM  | 64QAM  | 64QAM  | 64QAM  |
| Transport Block Size                                                                                                                                       |      | 11528          | 27144  | 60456  | 92200  | 127080 |
| Transport block CRC                                                                                                                                        | Bits | 24             | 24     | 24     | 24     | 24     |
| LDPC base graph                                                                                                                                            |      | 1              | 1      | 1      | 1      | 1      |
| Number of Code Blocks per Slot                                                                                                                             |      | 2              | 4      | 8      | 11     | 16     |
| Beta offset for 2nd stage SCI                                                                                                                              |      | 6.25           | 6.25   | 6.25   | 6.25   | 6.25   |
| $\gamma$ value when 2nd stage SCI rate match                                                                                                               |      | 7              | 1      | 1      | 1      | 1      |
| Binary Channel Bits per Slot                                                                                                                               |      | 15336          | 35964  | 79524  | 123084 | 167436 |
| Max. Throughput averaged over 100ms                                                                                                                        | Mbps | 1.1528         | 2.7144 | 6.0456 | 9.22   | 12.708 |
| NOTE 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).            |      |                |        |        |        |        |
| NOTE 2: $\gamma$ is the number of vacant resource elements in the resource block to which the last coded symbol of the 2 <sup>nd</sup> -stage SCI belongs. |      |                |        |        |        |        |
| NOTE 3: The CBW is only applicable for PS UE in n14.                                                                                                       |      |                |        |        |        |        |

**Table A.7.3-2: Fixed reference channel for V2X receiver requirements (SCS 30 kHz, 64QAM)**

| Parameter                                                                                                                                                  | Unit | Value  |        |        |        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------|--------|--------|--------|
| Channel bandwidth                                                                                                                                          | MHz  | 10     | 20     | 30     | 40     |
| Subcarrier spacing                                                                                                                                         | kHz  | 30     | 30     | 30     | 30     |
| Subchannel size                                                                                                                                            |      | 12     | 10     | 15     | 15     |
| Allocated resource blocks                                                                                                                                  |      | 24     | 50     | 75     | 105    |
| MCS Index                                                                                                                                                  |      | 24     | 24     | 24     | 24     |
| MCS Table for TBS determination                                                                                                                            |      | 64QAM  |        |        |        |
| Modulation                                                                                                                                                 |      | 64QAM  | 64QAM  | 64QAM  | 64QAM  |
| Transport Block Size                                                                                                                                       |      | 11528  | 27144  | 42016  | 60456  |
| Transport block CRC                                                                                                                                        | Bits | 24     | 24     | 24     | 24     |
| LDPC base graph                                                                                                                                            |      | 1      | 1      | 1      | 1      |
| Number of Code Blocks per Slot                                                                                                                             |      | 2      | 4      | 5      | 8      |
| Beta offset for 2nd stage SCI                                                                                                                              |      | 6.25   | 6.25   | 6.25   | 6.25   |
| $\gamma$ value when 2nd stage SCI rate match                                                                                                               |      | 7      | 1      | 1      | 1      |
| Binary Channel Bits per Slot                                                                                                                               |      | 15336  | 35964  | 55764  | 79524  |
| Max. Throughput averaged over 100ms                                                                                                                        | Mbps | 2.3056 | 5.4288 | 8.4032 | 12.091 |
| NOTE 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).            |      |        |        |        |        |
| NOTE 2: $\gamma$ is the number of vacant resource elements in the resource block to which the last coded symbol of the 2 <sup>nd</sup> -stage SCI belongs. |      |        |        |        |        |

**TableA.7.3-3: Fixed reference channel for V2X receiver requirements (SCS 60 kHz, 64QAM)**

| Parameter          | Unit | Value |    |    |    |
|--------------------|------|-------|----|----|----|
| Channel bandwidth  | MHz  | 10    | 20 | 30 | 40 |
| Subcarrier spacing | kHz  | 60    | 60 | 60 | 60 |
| Subchannel size    |      | 10    | 12 | 12 | 10 |

|                                                                                                                                                            |      |       |        |       |        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------|--------|-------|--------|
| Allocated resource blocks                                                                                                                                  |      | 10    | 24     | 36    | 50     |
| MCS Index                                                                                                                                                  |      | 24    | 24     | 24    | 24     |
| MCS Table for TBS determination                                                                                                                            |      | 64QAM |        |       |        |
| Modulation                                                                                                                                                 |      | 64QAM | 64QAM  | 64QAM | 64QAM  |
| Transport Block Size                                                                                                                                       |      | 3240  | 11528  | 18960 | 27144  |
| Transport block CRC                                                                                                                                        | Bits | 16    | 24     | 24    | 24     |
| LDPC base graph                                                                                                                                            |      | 2     | 1      | 1     | 1      |
| Number of Code Blocks per Slot                                                                                                                             |      | 1     | 2      | 3     | 4      |
| Beta offset for 2nd stage SCI                                                                                                                              |      | 6.25  | 6.25   | 6.25  | 6.25   |
| $\gamma$ value when 2nd stage SCI rate match                                                                                                               |      | 7     | 7      | 7     | 1      |
| Binary Channel Bits per Slot                                                                                                                               |      | 4248  | 15336  | 24840 | 35964  |
| Max. Throughput averaged over 100ms                                                                                                                        | Mbps | 1.296 | 4.6112 | 7.584 | 10.858 |
| NOTE 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).            |      |       |        |       |        |
| NOTE 2: $\gamma$ is the number of vacant resource elements in the resource block to which the last coded symbol of the 2 <sup>nd</sup> -stage SCI belongs. |      |       |        |       |        |

## A.7.4 FRC for maximum input level for 256QAM

For V2X transmission over PC5, Table A.7.4-1, Table A.7.4-2 and Table A.7.4-3 are applicable for Maximum input level when the 256QAM is supported.

**Table A.7.4-1: Fixed reference channel for V2X receiver requirements (SCS 15 kHz, 256QAM)**

| Parameter                                                                                                                                                  | Unit | Value          |        |        |        |        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------------|--------|--------|--------|--------|
| Channel bandwidth                                                                                                                                          | MHz  | 5 <sup>3</sup> | 10     | 20     | 30     | 40     |
| Subcarrier spacing                                                                                                                                         | kHz  | 15             | 15     | 15     | 15     | 15     |
| Subchannel size                                                                                                                                            |      | 12             | 10     | 15     | 10     | 12     |
| Allocated resource blocks                                                                                                                                  |      | 24             | 50     | 105    | 160    | 216    |
| MCS Index                                                                                                                                                  |      | 23             | 23     | 23     | 23     | 23     |
| MCS Table for TBS determination                                                                                                                            |      | 256QAM         |        |        |        |        |
| Modulation                                                                                                                                                 |      | 256QAM         | 256QAM | 256QAM | 256QAM | 256QAM |
| Transport Block Size                                                                                                                                       |      | 15880          | 36896  | 81976  | 127080 | 172176 |
| Transport block CRC                                                                                                                                        | Bits | 24             | 24     | 24     | 24     | 24     |
| LDPC base graph                                                                                                                                            |      | 1              | 1      | 1      | 1      | 1      |
| Number of Code Blocks per Slot                                                                                                                             |      | 2              | 5      | 10     | 16     | 21     |
| Beta offset for 2nd stage SCI                                                                                                                              |      | 6.25           | 6.25   | 6.25   | 6.25   | 6.25   |
| $\gamma$ value when 2nd stage SCI rate match                                                                                                               |      | 3              | 3      | 3      | 3      | 3      |
| Binary Channel Bits per Slot                                                                                                                               |      | 20544          | 48000  | 106080 | 164160 | 223296 |
| Max. Throughput averaged over 100ms                                                                                                                        | Mbps | 1.588          | 3.6896 | 8.1976 | 12.708 | 17.218 |
| NOTE 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).            |      |                |        |        |        |        |
| NOTE 2: $\gamma$ is the number of vacant resource elements in the resource block to which the last coded symbol of the 2 <sup>nd</sup> -stage SCI belongs. |      |                |        |        |        |        |
| NOTE 3: The CBW is only applicable for PS UE in n14.                                                                                                       |      |                |        |        |        |        |

**Table A.7.4-2: Fixed reference channel for V2X receiver requirements (SCS 30 kHz, 256QAM)**

| Parameter                                    | Unit | Value  |        |        |        |
|----------------------------------------------|------|--------|--------|--------|--------|
| Channel bandwidth                            | MHz  | 10     | 20     | 30     | 40     |
| Subcarrier spacing                           | kHz  | 30     | 30     | 30     | 30     |
| Subchannel size                              |      | 12     | 10     | 15     | 15     |
| Allocated resource blocks                    |      | 24     | 50     | 75     | 105    |
| MCS Index                                    |      | 23     | 23     | 23     | 23     |
| MCS Table for TBS determination              |      | 256QAM |        |        |        |
| Modulation                                   |      | 256QAM | 256QAM | 256QAM | 256QAM |
| Transport Block Size                         |      | 15880  | 36896  | 58384  | 81976  |
| Transport block CRC                          | Bits | 24     | 24     | 24     | 24     |
| LDPC base graph                              |      | 1      | 1      | 1      | 1      |
| Number of Code Blocks per Slot               |      | 2      | 5      | 7      | 10     |
| Beta offset for 2nd stage SCI                |      | 6.25   | 6.25   | 6.25   | 6.25   |
| $\gamma$ value when 2nd stage SCI rate match |      | 3      | 3      | 3      | 3      |

|                                                                                                                                                            |      |       |        |        |        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------|--------|--------|--------|
| Binary Channel Bits per Slot                                                                                                                               |      | 20544 | 48000  | 74400  | 106080 |
| Max. Throughput averaged over 100ms                                                                                                                        | Mbps | 3.176 | 7.3792 | 11.677 | 16.395 |
| NOTE 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).            |      |       |        |        |        |
| NOTE 2: $\gamma$ is the number of vacant resource elements in the resource block to which the last coded symbol of the 2 <sup>nd</sup> -stage SCI belongs. |      |       |        |        |        |

**Table A.7.4-3: Fixed reference channel for V2X receiver requirements (SCS 60kHz, 256QAM)**

| Parameter                                                                                                                                                  | Unit | Value  |        |        |        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------|--------|--------|--------|
| Channel bandwidth                                                                                                                                          | MHz  | 10     | 20     | 30     | 40     |
| Subcarrier spacing                                                                                                                                         | kHz  | 60     | 60     | 60     | 60     |
| Subchannel size                                                                                                                                            |      | 10     | 12     | 12     | 10     |
| Allocated resource blocks                                                                                                                                  |      | 10     | 24     | 36     | 50     |
| MCS Index                                                                                                                                                  |      | 23     | 23     | 23     | 23     |
| MCS Table for TBS determination                                                                                                                            |      | 256QAM |        |        |        |
| Modulation                                                                                                                                                 |      | 256QAM | 256QAM | 256QAM | 256QAM |
| Transport Block Size                                                                                                                                       |      | 4480   | 15880  | 25608  | 36896  |
| Transport block CRC                                                                                                                                        | Bits | 24     | 24     | 24     | 24     |
| LDPC base graph                                                                                                                                            |      | 1      | 1      | 1      | 1      |
| Number of Code Blocks per Slot                                                                                                                             |      | 1      | 2      | 4      | 5      |
| Beta offset for 2nd stage SCI                                                                                                                              |      | 6.25   | 6.25   | 6.25   | 6.25   |
| $\gamma$ value when 2nd stage SCI rate match                                                                                                               |      | 3      | 3      | 3      | 3      |
| Binary Channel Bits per Slot                                                                                                                               |      | 5760   | 20544  | 33216  | 48000  |
| Max. Throughput averaged over 100ms                                                                                                                        | Mbps | 1.792  | 6.352  | 10.243 | 14.758 |
| NOTE 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).            |      |        |        |        |        |
| NOTE 2: $\gamma$ is the number of vacant resource elements in the resource block to which the last coded symbol of the 2 <sup>nd</sup> -stage SCI belongs. |      |        |        |        |        |

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## Annex B (informative): Void

## Annex C (informative): Downlink physical channels

### C.1 General

The following clauses, describes the downlink Physical Channels that are transmitted during a connection i.e., when measurements are done.

### C.2 Setup

Table C.2-1 describes the downlink Physical Channels that are required for connection set up.

**Table C.2-1: Downlink Physical Channels required  
for connection set-up**

| Physical Channel |
|------------------|
| PBCH             |
| SSS              |
| PSS              |
| PDCCH            |
| PDSCH            |
| PBCH DMRS        |
| PDCCH DMRS       |
| PDSCH DMRS       |
| CSI-RS           |

### C.3 Connection

#### C.3.1 Measurement of Receiver Characteristics

Unless otherwise stated, Table C.3.1-1 is applicable for measurements on the Receiver Characteristics (clause 7).

**Table C.3.1-1: Downlink Physical Channels transmitted during a connection (FDD and TDD)**

| Parameter                                                                                                                                                                                                                             | Unit | Value         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------|
| SSS transmit power                                                                                                                                                                                                                    | W    | Test specific |
| EPRE ratio of PSS to SSS                                                                                                                                                                                                              | dB   | 0             |
| EPRE ratio of PBCH to SSS                                                                                                                                                                                                             | dB   | 0             |
| EPRE ratio of PBCH to PBCH DMRS                                                                                                                                                                                                       | dB   | 0             |
| EPRE ratio of PDCCH to SSS                                                                                                                                                                                                            | dB   | 0             |
| EPRE ratio of PDCCH to PDCCH DMRS                                                                                                                                                                                                     | dB   | 0             |
| EPRE ratio of PDSCH to SSS                                                                                                                                                                                                            | dB   | 0             |
| EPRE ratio of PDSCH to PDSCH DMRS (Note 1)                                                                                                                                                                                            | dB   | -3            |
| EPRE ratio of CSI-RS to SSS                                                                                                                                                                                                           | dB   | 0             |
| EPRE ratio of PTRS to PDSCH                                                                                                                                                                                                           | dB   | Test specific |
| EPRE ratio of OCNG DMRS to SSS                                                                                                                                                                                                        | dB   | 0             |
| EPRE ratio of OCNG to OCNG DMRS (Note 1)                                                                                                                                                                                              | dB   | 0             |
| NOTE 1: No boosting is applied to any of the channels except PDSCH DMRS. For PDSCH DMRS, 3 dB power boosting is applied assuming DMRS Type 1 configuration when DMRS and PDSCH are TDM'ed and only half of the DMRS REs are occupied. |      |               |
| NOTE 2: Number of DMRS CDM groups without data for PDSCH DMRS configuration for OCNG is set to 1.                                                                                                                                     |      |               |



## Annex D (normative): Characteristics of the interfering signal

### D.1 General

Some RF performance requirements for the NR UE receiver are defined with interfering signals present in addition to the wanted signal.

For NR bands with  $F_{DL\_high} < 2700$  MHz and  $F_{UL\_high} < 2700$  MHz, a modulated 5 MHz full bandwidth NR down link signal, and in some cases an additional CW signal, are used as interfering signal. For intra-band contiguous CA bandwidth class B and C, a modulated 5 MHz NR downlink signal is used. And for some cases an additional CW signal is used.

For NR bands with  $F_{DL\_low} \geq 3300$  MHz and  $F_{UL\_low} \geq 3300$  MHz, a modulated NR downlink signal which equals to channel bandwidth of the wanted signal for single carrier and inter-band CA cases is used as interfering signal. For intra-band contiguous CA bandwidth Class C, a modulated NR downlink signal which equals to the aggregated channel bandwidth of the wanted signal is used. For intra-band contiguous CA bandwidth class D and E cases, a modulated 50 MHz NR downlink signal is used. And for some cases an additional CW signal is used.

### D.2 Interference signals

Table D.2-1 and Table D.2-4 describes the modulated interferer for different channel bandwidth options for NR band lower than 2700MHz.

**Table D.2-1: Description of modulated NR interferer for NR bands with  $F_{DL\_high} < 2700$  MHz and  $F_{UL\_high} < 2700$  MHz**

|                                                                                                                                          | Channel bandwidth |        |        |        |        |         |
|------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------|--------|--------|--------|---------|
|                                                                                                                                          | 5 MHz             | 10MHz  | 15 MHz | 20 MHz | 25 MHz | 30 MHz  |
| RB                                                                                                                                       | NOTE 1            |        |        |        |        |         |
| BW <sub>interferer</sub>                                                                                                                 | 5 MHz             |        |        |        |        |         |
|                                                                                                                                          | Channel bandwidth |        |        |        |        |         |
|                                                                                                                                          | 40 MHz            | 50 MHz | 60 MHz | 80 MHz | 90 MHz | 100 MHz |
| RB                                                                                                                                       | NOTE 1            |        |        |        |        |         |
| BW <sub>interferer</sub>                                                                                                                 | 5 MHz             |        |        |        |        |         |
| NOTE 1: The RB configured for interfering signal is the same as maximum RB number defined in Table 5.3.2-1 for each sub-carrier spacing. |                   |        |        |        |        |         |

Table D.2-2 and Table D.2-3 describe the modulated interferer for different channel bandwidth options for NR band higher than 3300MHz.

**Table D.2-2: Description of modulated NR interferer for NR bands with  $F_{DL\_low} \geq 3300$  MHz and  $F_{UL\_low} \geq 3300$  MHz**

|                                                                                                                                          | Channel bandwidth |        |        |        |        |        |        |        |         |
|------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------|--------|--------|--------|--------|--------|--------|---------|
|                                                                                                                                          | 10 MHz            | 15 MHz | 20 MHz | 40 MHz | 50 MHz | 60 MHz | 80 MHz | 90 MHz | 100 MHz |
| RB                                                                                                                                       | NOTE 1            |        |        |        |        |        |        |        |         |
| BW <sub>Interferer</sub>                                                                                                                 | 10 MHz            | 15 MHz | 20 MHz | 40 MHz | 50 MHz | 60 MHz | 80 MHz | 90 MHz | 100 MHz |
| NOTE 1: The RB configured for interfering signal is the same as maximum RB number defined in Table 5.3.2-1 for each sub-carrier spacing. |                   |        |        |        |        |        |        |        |         |

**Table D.2-3: Description of modulated NR interferer for NR bands with  $F_{DL\_low} \geq 3300$  MHz and  $F_{UL\_low} \geq 3300$  MHz for Intra-band contiguous CA**

|                                                                                                                                                                                                                                  | Aggregated Channel bandwidth of Bandwidth Class C |         |         |         |         |         |         |         | Bandwidth Class D/E |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------------------|
|                                                                                                                                                                                                                                  | 110 MHz                                           | 120 MHz | 130 MHz | 140 MHz | 150 MHz | 160 MHz | 180 MHz | 200 MHz |                     |
| RB(SCS=30 kHz)                                                                                                                                                                                                                   | NOTE 1                                            |         |         |         |         |         |         |         | 133                 |
| RB(SCS=60 kHz)                                                                                                                                                                                                                   | NOTE 1                                            |         |         |         |         |         |         |         | 65                  |
| $BW_{interferer}$                                                                                                                                                                                                                | 110 MHz                                           | 120 MHz | 130 MHz | 140 MHz | 150 MHz | 160 MHz | 180 MHz | 200 MHz | 50MHz               |
| NOTE 1: The interfering signal shall be configured in the same way as the aggregated bandwidth of the wanted signal. The RB configurations for each component carrier are defined in Table 5.3.2-1 for each sub-carrier spacing. |                                                   |         |         |         |         |         |         |         |                     |

**Table D.2-4: Description of modulated NR interferer for NR bands with  $F_{DL\_low} < 2700$  MHz and  $F_{UL\_low} < 2700$  MHz for Intra-band contiguous CA**

|                                                                                                                                          | Bandwidth Class B | Bandwidth Class C |
|------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------------------|
| RB                                                                                                                                       | NOTE 1            | NOTE 1            |
| $BW_{interferer}$                                                                                                                        | 5 MHz             | 5 MHz             |
| NOTE 1: The RB configured for interfering signal is the same as maximum RB number defined in Table 5.3.2-1 for each sub-carrier spacing. |                   |                   |



## Annex E (normative): Environmental conditions

### E.1 General

This normative annex specifies the environmental requirements of the UE. Within these limits the requirements of the present documents shall be fulfilled.

### E.2 Environmental

The requirements in this clause apply to all types of UE(s).

#### E.2.1 Temperature

The UE shall fulfil all the requirements in the full temperature range of:

**Table E.2.1-1: Temperature conditions**

|                |                                                                 |
|----------------|-----------------------------------------------------------------|
| +15°C to +35°C | For normal conditions (with relative humidity up to 75 %)       |
| -10°C to +55°C | For extreme conditions (see IEC publications 68-2-1 and 68-2-2) |

Outside this temperature range the UE, if powered on, shall not make ineffective use of the radio frequency spectrum. In no case shall the UE exceed the transmitted levels as defined in clause 6.2 for extreme operation.

#### E.2.2 Voltage

The UE shall fulfil all the requirements in the full voltage range, i.e. the voltage range between the extreme voltages.

The manufacturer shall declare the lower and higher extreme voltages and the approximate shutdown voltage. For the equipment that can be operated from one or more of the power sources listed below, the lower extreme voltage shall not be higher, and the higher extreme voltage shall not be lower than that specified below.

**Table E.2.2-1: Voltage conditions**

| Power source                | Lower extreme voltage | Higher extreme voltage | Normal conditions voltage |
|-----------------------------|-----------------------|------------------------|---------------------------|
| AC mains                    | 0,9 * nominal         | 1,1 * nominal          | nominal                   |
| Regulated lead acid battery | 0,9 * nominal         | 1,3 * nominal          | 1,1 * nominal             |
| Non regulated batteries:    |                       |                        |                           |
| Leclanché                   | 0,85 * nominal        | Nominal                | Nominal                   |
| Lithium                     | 0,95 * nominal        | 1,1 * Nominal          | 1,1 * Nominal             |
| Mercury/nickel & cadmium    | 0,90 * nominal        |                        | Nominal                   |

Outside this voltage range the UE if powered on, shall not make ineffective use of the radio frequency spectrum. In no case shall the UE exceed the transmitted levels as defined in clause 6.2 for extreme operation. In particular, the UE shall inhibit all RF transmissions when the power supply voltage is below the manufacturer declared shutdown voltage.

E.2.3 Vibration

The UE shall fulfil all the requirements when vibrated at the following frequency/amplitudes.

**Table E.2.3-1: Vibration conditions**

| Frequency       | ASD (Acceleration Spectral Density) random vibration                  |
|-----------------|-----------------------------------------------------------------------|
| 5 Hz to 20 Hz   | 0.96 m <sup>2</sup> /s <sup>3</sup>                                   |
| 20 Hz to 500 Hz | 0.96 m <sup>2</sup> /s <sup>3</sup> at 20 Hz, thereafter –3 dB/Octave |

Outside the specified frequency range the UE, if powered on, shall not make ineffective use of the radio frequency spectrum. In no case shall the UE exceed the transmitted levels as defined in TS 38.101-1 for extreme operation.

## Annex F (normative): Transmit modulation

### F.0 General

While measuring the transmit modulation quality of carriers, an existence of the carrier leakage needs to be taken into account indicated by the parameters in *UplinkTxDirectCurrent* IE, *UplinkTxDirectCurrentTwoCarrierList-r16* or *UplinkTxDirectCurrentMoreCarrierList*.

### F.1 Measurement Point

Figure F.1-1 shows the measurement point for the unwanted emission falling into non-allocated RB(s) and the EVM for the allocated RB(s).

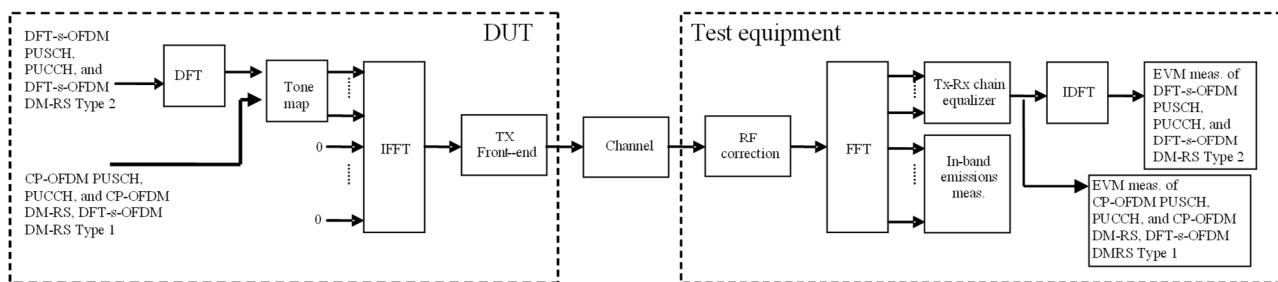


Figure F.1-1: EVM measurement points

### F.2 Basic Error Vector Magnitude measurement

The EVM is the difference between the ideal waveform and the measured waveform for the allocated RB(s)

$$EVM = \sqrt{\frac{\sum_{v \in T_m} |z'(v) - i(v)|^2}{|T_m| \cdot P_0}},$$

where

$T_m$  is a set of  $|T_m|$  modulation symbols with the considered modulation scheme being active within the measurement period,

$z'(v)$  are the samples of the signal evaluated for the EVM,

$i(v)$  is the ideal signal reconstructed by the measurement equipment, and

$P_0$  is the average power of the ideal signal. For normalized modulation symbols  $P_0$  is equal to 1.

The basic EVM measurement interval is defined over one slot in the time domain for PUCCH and PUSCH and over one preamble sequence for the PRACH.

## F.3 Basic in-band emissions measurement

The in-band emissions are a measure of the interference falling into the non-allocated resources blocks. The in-band emission requirement is evaluated for PUCCH and PUSCH transmissions. The in-band emission requirement is not evaluated for PRACH transmissions.

The in-band emissions are measured as follows

$$Emissions_{absolute}(\Delta_{RB}) = \begin{cases} \frac{1}{|T_s|} \sum_{t \in T_s} \sum_{f_l + (12 \cdot \Delta_{RB} + 11) \cdot \Delta f}^{\max(f_{\min}, f_l + 12 \cdot \Delta_{RB} \cdot \Delta f)} |Y(t, f)|^2, \Delta_{RB} < 0 \\ \frac{1}{|T_s|} \sum_{t \in T_s} \sum_{f_h + (12 \cdot \Delta_{RB} - 11) \cdot \Delta f}^{\min(f_{\max}, f_h + 12 \cdot \Delta_{RB} \cdot \Delta f)} |Y(t, f)|^2, \Delta_{RB} > 0 \end{cases},$$

where

$T_s$  is a set of  $|T_s|$  OFDM symbols with the considered modulation scheme being active within the measurement period,

$\Delta_{RB}$  is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g.  $\Delta_{RB} = 1$  or  $\Delta_{RB} = -1$  for the first adjacent RB),

$f_{\min}$  (resp.  $f_{\max}$ ) is the lower (resp. upper) edge of the UL UE channel bandwidth,

$f_l$  and  $f_h$  are the lower and upper edge of the allocated BW, and

$Y(t, f)$  is the frequency domain signal evaluated for in-band emissions as defined in the clause (ii)

The relative in-band emissions are, given by

$$Emissions_{relative}(\Delta_{RB}) = \frac{Emissions_{absolute}(\Delta_{RB})}{\frac{1}{|T_s| \cdot N_{RB}} \sum_{t \in T_s} \sum_{f_l}^{f_l + (12 \cdot N_{RB} - 1) \cdot \Delta f} |Y(t, f)|^2}$$

where

$N_{RB}$  is the number of allocated RBs

The basic in-band emissions measurement interval is defined over one slot in the time domain. When the PUSCH or PUCCH transmission slot is shortened due to multiplexing with SRS, the in-band emissions measurement interval is reduced by one OFDM symbol, accordingly.

In the evaluation of in-band emissions, the timing is set according to  $\tilde{\Delta f} = \tilde{\Delta C}$ , where sample time offsets  $\tilde{\Delta f}$  and  $\tilde{\Delta C}$  are defined in clause F.4.

## F.4 Modified signal under test

Implicit in the definition of EVM is an assumption that the receiver is able to compensate a number of transmitter impairments.

The DFT-s-OFDM modulated signals or PRACH signal under test is modified and, in the case of DFT-s-OFDM modulated signals, decoded according to:

$$Z'(t, f) = IDFT \left\{ \frac{FFT \left\{ z(v - \Delta \tilde{t}) \cdot e^{-j2\pi \Delta \tilde{f} v} \right\} e^{j2\pi f \Delta \tilde{t}}}{\tilde{a}(t, f) \cdot e^{j\tilde{\varphi}(t, f)}} \right\}$$

where

$z(v)$  is the time domain samples of the signal under test.

The CP-OFDM modulated signals or PUSCH demodulation reference signal or PUCCH data signal under test is equalised and, in the case of CP-OFDM modulated signals decoded according to:

$$Z'(t, f) = \frac{FFT \left\{ z(v - \Delta \tilde{t}) \cdot e^{-j2\pi \Delta \tilde{f} v} \right\} e^{j2\pi f \Delta \tilde{t}}}{\tilde{a}(t, f) \cdot e^{j\tilde{\varphi}(t, f)}}$$

where

$z(v)$  is the time domain samples of the signal under test.

To minimize the error, the signal under test should be modified with respect to a set of parameters following the procedure explained below.

Notation:

$\Delta \tilde{t}$  is the sample timing difference between the FFT processing window in relation to nominal timing of the ideal signal.

$\Delta \tilde{f}$  is the RF frequency offset.

$\tilde{\varphi}(t, f)$  is the phase response of the TX chain.

$\tilde{a}(t, f)$  is the amplitude response of the TX chain.

In the following  $\Delta \tilde{c}$  represents the middle sample of the EVM window of length  $W$  (defined in the next clauses) or the last sample of the first window half if  $W$  is even.

The EVM analyser shall

- detect the start of each slot and estimate  $\Delta \tilde{c}$  and  $\hat{\Delta \tilde{c}}$ ,
- determine  $\Delta \tilde{c}$  so that the EVM window of length  $W$  is centred
  - on the time interval determined by the measured cyclic prefix minus  $16\kappa$  samples of the considered OFDM symbol for symbol  $l$  for subcarrier spacing configuration  $\mu$  in a subframe, with  $l = 0$  or  $l = 7 \cdot 2^\mu$  for normal CP, i.e. the first  $16\kappa$  samples of the CP should not be taken into account for this step. In the determination of the number of excluded samples, a sampling rate of  $1/T_c$  is assumed. If a different sampling rate is used, the number of excluded samples is scaled linearly.
  - on the measured cyclic prefix of the considered OFDM symbol for all other symbols for normal CP and for symbol 0 to 11 for extended CP.

- on the measured preamble cyclic prefix for the PRACH

To determine the other parameters a sample timing offset equal to  $\Delta\tilde{\tau}$  is corrected from the signal under test. The EVM analyser shall then

- correct the RF frequency offset  $\hat{\Delta f}$  for each time slot, and
- apply an FFT of appropriate size. The chosen FFT size shall ensure that in the case of an ideal signal under test, there is no measured inter-subcarrier interference.

The carrier leakage shall be removed from the evaluated signal before calculating the EVM and the in-band emissions; however, the removed relative carrier leakage power also has to satisfy the applicable requirement.

At this stage the allocated RBs shall be separated from the non-allocated RBs. In the case of PUCCH and PUSCH EVM, the signal on the non-allocated RB(s),  $y(t, f)$ , is used to evaluate the in-band emissions.

Moreover, the following procedure applies only to the signal on the allocated RB(s).

- In the case of PUCCH and PUSCH, the UL EVM analyzer shall estimate the TX chain equalizer coefficients  $\tilde{a}(t, f)$  and  $\tilde{\varphi}(t, f)$  used by the ZF equalizer for all subcarriers by time averaging at each signal subcarrier of the amplitude and phase of the reference and data symbols. The time-averaging length is 1 slot. This process creates an average amplitude and phase for each signal subcarrier used by the ZF equalizer. The knowledge of data modulation symbols may be required in this step because the determination of symbols by demodulation is not reliable before signal equalization.
- In the case of PRACH, the UL EVM analyzer shall estimate the TX chain coefficients  $\tilde{a}(t)$  and  $\tilde{\varphi}(t)$  used for phase and amplitude correction and are selected so as to minimize the resulting EVM. The TX chain coefficients are not dependent on frequency, i.e.  $\tilde{a}(t, f) = \tilde{a}(t)$  and  $\tilde{\varphi}(t, f) = \tilde{\varphi}(t)$ . The TX chain coefficient are chosen independently for each preamble transmission and for each  $\Delta\tilde{\tau}$ .

At this stage estimates of  $\hat{\Delta f}$ ,  $\tilde{a}(t, f)$ ,  $\tilde{\varphi}(t, f)$  and  $\Delta\tilde{\tau}$  are available.  $\Delta\tilde{\tau}$  is one of the extremities of the window  $W$ , i.e.  $\Delta\tilde{\tau}$  can be  $\Delta\tilde{\tau} + \alpha - \left\lfloor \frac{W}{2} \right\rfloor$  or  $\Delta\tilde{\tau} + \left\lfloor \frac{W}{2} \right\rfloor$ , where  $\alpha = 0$  if  $W$  is odd and  $\alpha = 1$  if  $W$  is even. The EVM analyser shall then

- calculate  $\text{EVM}_l$  with  $\Delta\tilde{\tau}$  set to  $\Delta\tilde{\tau} + \alpha - \left\lfloor \frac{W}{2} \right\rfloor$ ,
- calculate  $\text{EVM}_h$  with  $\Delta\tilde{\tau}$  set to  $\Delta\tilde{\tau} + \left\lfloor \frac{W}{2} \right\rfloor$ .

For the EVM calculation on the symbols with a transient period when the UE signals a transient period capability (tp) of 2, 4 or 7usec,  $\Delta\tilde{\tau}$  is given below.

- calculate  $\text{EVM}_{l_{tp}}$  with  $\Delta\tilde{\tau}$  set to  $\left\lfloor \frac{tp + tp_{start}}{T_c} \right\rfloor + 1$ , where  $1/T_c$  is the sampling rate
- calculate  $\text{EVM}_{h_{tp}}$  with  $\Delta\tilde{\tau}$  set to  $\left\lfloor \frac{CP + tp_{start}}{T_c} \right\rfloor - 1$ , where  $1/T_c$  is the sampling rate and the CP is the cyclic prefix of the symbol on which EVM is calculated (e.g. long CP for the first symbol of the slot) in seconds

A pictorial representation of the EVM measurement windows is given in Figure F.4-1.

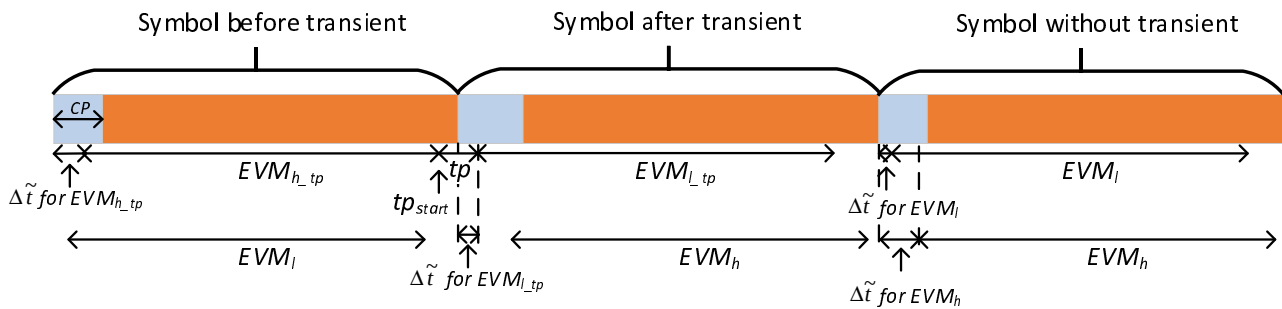


Figure F.4-1 EVM measurement window

## F.5 Window length

### F.5.1 Timing offset

As a result of using a cyclic prefix, there is a range of  $\Delta\tilde{t}$ , which, at least in the case of perfect Tx signal quality, would give close to minimum error vector magnitude. As a first order approximation, that range should be equal to the length of the cyclic prefix. Any time domain windowing or FIR pulse shaping applied by the transmitter reduces the  $\Delta\tilde{t}$  range within which the error vector is close to its minimum.

### F.5.2 Window length

The window length  $W$  affects the measured EVM and is expressed as a function of the configured cyclic prefix length. In the case where equalization is present, as with frequency domain EVM computation, the effect of FIR is reduced. This is because the equalization can correct most of the linear distortion introduced by the FIR. However, the time domain windowing effect can't be removed.

### F.5.3 Window length for normal CP

Tables F.5.3-1, F.5.3-2, and F.5.3-3 below specify the EVM window length ( $W$ ) for normal CP.

Table F.5.3-1: EVM window length for normal CP for NR, FR1, 15 kHz SCS

| Channel Bandwidth (MHz) | FFT size | Cyclic prefix length for symbols 1-6 and 8-13 in FFT samples | EVM window length $W$ | Ratio of $W$ to total CP length for symbols 1-6 and 8-13 <sup>1</sup> (%) |
|-------------------------|----------|--------------------------------------------------------------|-----------------------|---------------------------------------------------------------------------|
| 5                       | 512      | 36                                                           | 18                    | 50                                                                        |
| 10                      | 1024     | 72                                                           | 36                    | 50                                                                        |
| 15                      | 1536     | 108                                                          | 54                    | 50                                                                        |
| 20                      | 2048     | 144                                                          | 72                    | 50                                                                        |
| 25                      | 2048     | 144                                                          | 72                    | 50                                                                        |
| 30                      | 3072     | 216                                                          | 108                   | 50                                                                        |
| 35                      | 3072     | 216                                                          | 108                   | 50                                                                        |
| 40                      | 4096     | 288                                                          | 144                   | 50                                                                        |
| 45                      | 4096     | 288                                                          | 144                   | 50                                                                        |
| 50                      | 4096     | 288                                                          | 144                   | 50                                                                        |

NOTE 1: These percentages are informative and apply to a slot's symbols 1 to 6 and 8 to 13. Symbols 0 and 7 have a longer CP and therefore a lower percentage.

Table F.5.3-2: EVM window length for normal CP for NR, FR1, 30 kHz SCS

| Channel Bandwidth (MHz)                                                                                                                          | FFT size | Cyclic prefix length for symbols 1-13 in FFT samples | EVM window length $W$ | Ratio of $W$ to total CP length for symbols 1-13 <sup>1</sup> (%) |
|--------------------------------------------------------------------------------------------------------------------------------------------------|----------|------------------------------------------------------|-----------------------|-------------------------------------------------------------------|
| 5                                                                                                                                                | 256      | 18                                                   | 9                     | 50                                                                |
| 10                                                                                                                                               | 512      | 36                                                   | 18                    | 50                                                                |
| 15                                                                                                                                               | 768      | 54                                                   | 27                    | 50                                                                |
| 20                                                                                                                                               | 1024     | 72                                                   | 36                    | 50                                                                |
| 25                                                                                                                                               | 1024     | 72                                                   | 36                    | 50                                                                |
| 30                                                                                                                                               | 1536     | 108                                                  | 54                    | 50                                                                |
| 35                                                                                                                                               | 1536     | 108                                                  | 54                    | 50                                                                |
| 40                                                                                                                                               | 2048     | 144                                                  | 72                    | 50                                                                |
| 45                                                                                                                                               | 2048     | 144                                                  | 72                    | 50                                                                |
| 50                                                                                                                                               | 2048     | 144                                                  | 72                    | 50                                                                |
| 60                                                                                                                                               | 3072     | 216                                                  | 108                   | 50                                                                |
| 70                                                                                                                                               | 3072     | 216                                                  | 108                   | 50                                                                |
| 80                                                                                                                                               | 4096     | 288                                                  | 144                   | 50                                                                |
| 90                                                                                                                                               | 4096     | 288                                                  | 144                   | 50                                                                |
| 100                                                                                                                                              | 4096     | 288                                                  | 144                   | 50                                                                |
| NOTE 1: These percentages are informative and apply to a slot's symbols 1 through 13. Symbol 0 has a longer CP and therefore a lower percentage. |          |                                                      |                       |                                                                   |

Table F.5.3-3: EVM window length for normal CP for NR (60 kHz SCS)

| Channel Bandwidth (MHz)                                                                                                                                                                                                | FFT size | Cyclic prefix length for symbols in FFT samples | EVM window length $W$ | Ratio of $W$ to total CP length <sup>1</sup> (%) |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------------------------------------------------|-----------------------|--------------------------------------------------|
| 10                                                                                                                                                                                                                     | 256      | 18                                              | 9                     | 50                                               |
| 15                                                                                                                                                                                                                     | 384      | 27                                              | 14                    | 50                                               |
| 20                                                                                                                                                                                                                     | 512      | 36                                              | 18                    | 50                                               |
| 25                                                                                                                                                                                                                     | 512      | 36                                              | 18                    | 50                                               |
| 30                                                                                                                                                                                                                     | 768      | 54                                              | 27                    | 50                                               |
| 35                                                                                                                                                                                                                     | 768      | 54                                              | 27                    | 50                                               |
| 40                                                                                                                                                                                                                     | 1024     | 72                                              | 36                    | 50                                               |
| 45                                                                                                                                                                                                                     | 1024     | 72                                              | 36                    | 50                                               |
| 50                                                                                                                                                                                                                     | 1024     | 72                                              | 36                    | 50                                               |
| 60                                                                                                                                                                                                                     | 1536     | 108                                             | 54                    | 50                                               |
| 70                                                                                                                                                                                                                     | 1536     | 108                                             | 54                    | 50                                               |
| 80                                                                                                                                                                                                                     | 2048     | 144                                             | 72                    | 50                                               |
| 90                                                                                                                                                                                                                     | 2048     | 144                                             | 72                    | 50                                               |
| 100                                                                                                                                                                                                                    | 2048     | 144                                             | 72                    | 50                                               |
| NOTE 1: These percentages are informative and apply to all OFDM symbols within subframe except for symbol 0 of slot 0 and slot 2. Symbol 0 of slot 0 and slot 2 may have a longer CP and therefore a lower percentage. |          |                                                 |                       |                                                  |

## F.5.4 Window length for Extended CP

Table F.5.4-1 below specifies the EVM window length ( $W$ ) for extended CP. The number of CP samples excluded from the EVM window is the same as for normal CP length.



Table F.5.4-1: EVM window length for extended CP for NR, FR1, 60 kHz SCS

| Channel Bandwidth (MHz)                    | FFT size | Cyclic prefix length in FFT samples | EVM window length $W$ | Ratio of $W$ to total CP length <sup>1</sup> (%) |
|--------------------------------------------|----------|-------------------------------------|-----------------------|--------------------------------------------------|
| 10                                         | 256      | 64                                  | 54                    | 84.4                                             |
| 15                                         | 384      | 96                                  | 80                    | 83.3                                             |
| 20                                         | 512      | 128                                 | 106                   | 82.8                                             |
| 25                                         | 512      | 128                                 | 110                   | 85.9                                             |
| 30                                         | 768      | 192                                 | 164                   | 85.4                                             |
| 35                                         | 768      | 192                                 | 164                   | 85.4                                             |
| 40                                         | 1024     | 256                                 | 220                   | 85.9                                             |
| 45                                         | 1024     | 256                                 | 220                   | 85.9                                             |
| 50                                         | 1024     | 256                                 | 220                   | 85.9                                             |
| 60                                         | 1536     | 384                                 | 330                   | 85.9                                             |
| 70                                         | 1536     | 384                                 | 330                   | 85.9                                             |
| 80                                         | 2048     | 512                                 | 440                   | 85.9                                             |
| 90                                         | 2048     | 512                                 | 440                   | 85.9                                             |
| 100                                        | 2048     | 512                                 | 440                   | 85.9                                             |
| NOTE 1: These percentages are informative. |          |                                     |                       |                                                  |

## F.5.5 Window length for PRACH

The table below specifies the EVM window length for PRACH preamble formats for  $L_{RA}=839$  and  $\Delta f^{RA} \in \{1.25, 5\}$  kHz.

Table F.5.5-1 EVM window length for PRACH formats for  $L_{RA}=839$ 

| Preamble format                                                                                               | Cyclic prefix length $N_{CP}$ | Nominal FFT size <sup>1</sup> | EVM window length $W$ in FFT samples | Ratio of $W$ to CP <sup>2</sup> |
|---------------------------------------------------------------------------------------------------------------|-------------------------------|-------------------------------|--------------------------------------|---------------------------------|
| 0                                                                                                             | 3168                          | 24576                         | 2307                                 | 72.8%                           |
| 1                                                                                                             | 21024                         | 24576                         | 20163                                | 95.9%                           |
| 2                                                                                                             | 4688                          | 24576                         | 3827                                 | 81.6%                           |
| 3                                                                                                             | 3168                          | 6144                          | 2952                                 | 93.2%                           |
| NOTE 1: The use of other FFT sizes is possible as long as appropriate scaling of the window length is applied |                               |                               |                                      |                                 |
| NOTE 2: These percentages are informative                                                                     |                               |                               |                                      |                                 |

The table below specifies the EVM window length for PRACH preamble formats for  $L_{RA}=139$  and  $\Delta f^{RA} = 15 \cdot 2^{\mu}$  kHz, where  $\mu \in \{0, 1, 2\}$ .

Table F.5.5-2 EVM window length for PRACH formats for  $L_{RA}=139$ 

| Preamble format                                                                                               | Cyclic prefix length $N_{CP}$ | Nominal FFT size <sup>1</sup> | EVM window length $W$ in FFT samples | Ratio of $W$ to CP <sup>2</sup> |
|---------------------------------------------------------------------------------------------------------------|-------------------------------|-------------------------------|--------------------------------------|---------------------------------|
| A1                                                                                                            | $288 \cdot 2^{\mu}$           | $2048 \cdot 2^{\mu}$          | $144 \cdot 2^{\mu}$                  | 50.0%                           |
| A2                                                                                                            | $576 \cdot 2^{\mu}$           | $2048 \cdot 2^{\mu}$          | $432 \cdot 2^{\mu}$                  | 75.0%                           |
| A3                                                                                                            | $864 \cdot 2^{\mu}$           | $2048 \cdot 2^{\mu}$          | $720 \cdot 2^{\mu}$                  | 83.3%                           |
| B1                                                                                                            | $216 \cdot 2^{\mu}$           | $2048 \cdot 2^{\mu}$          | $72 \cdot 2^{\mu}$                   | 33.3%                           |
| B2                                                                                                            | $360 \cdot 2^{\mu}$           | $2048 \cdot 2^{\mu}$          | $216 \cdot 2^{\mu}$                  | 60.0%                           |
| B3                                                                                                            | $504 \cdot 2^{\mu}$           | $2048 \cdot 2^{\mu}$          | $360 \cdot 2^{\mu}$                  | 71.4%                           |
| B4                                                                                                            | $936 \cdot 2^{\mu}$           | $2048 \cdot 2^{\mu}$          | $792 \cdot 2^{\mu}$                  | 84.6%                           |
| C0                                                                                                            | $1240 \cdot 2^{\mu}$          | $2048 \cdot 2^{\mu}$          | $1096 \cdot 2^{\mu}$                 | 88.4%                           |
| C2                                                                                                            | $2048 \cdot 2^{\mu}$          | $2048 \cdot 2^{\mu}$          | $1904 \cdot 2^{\mu}$                 | 93.0%                           |
| NOTE 1: The use of other FFT sizes is possible as long as appropriate scaling of the window length is applied |                               |                               |                                      |                                 |
| NOTE 2: These percentages are informative                                                                     |                               |                               |                                      |                                 |

## F.6 Averaged EVM

The general EVM is averaged over basic EVM measurements for  $n$  slots in the time domain.

$$\overline{EVM} = \sqrt{\frac{1}{n} \sum_{i=1}^n EVM_i^2},$$

where  $n$  is

$$n = \begin{cases} 10, & \text{for } 15 \text{ kHz SCS} \\ 20, & \text{for } 30 \text{ kHz SCS} \\ 40, & \text{for } 60 \text{ kHz SCS} \end{cases}$$

for PUCCH, PUSCH.

The EVM requirements shall be tested against the maximum of the RMS average at the window  $W$  extremities of the EVM measurements:

Thus  $\overline{EVM}_l$  is calculated using  $\Delta \tilde{t} = \Delta \tilde{t}_l$  in the expressions above and  $\overline{EVM}_h$  is calculated using  $\Delta \tilde{t} = \Delta \tilde{t}_h$ .

Thus we get:

$$EVM = \max(\overline{EVM}_l, \overline{EVM}_h)$$

The calculation of the EVM for the demodulation reference signal,  $EVM_{DMRS}$ , follows the same procedure as calculating the general EVM, with the exception that the modulation symbol set  $T_m$  defined in clause F.2 is restricted to symbols containing uplink demodulation reference signals.

The basic  $EVM_{DMRS}$  measurements are first averaged over  $n$  slots in the time domain to obtain an intermediate average  $\overline{EVM}_{DMRS}$ .

$$\overline{EVM}_{DMRS} = \sqrt{\frac{1}{n} \sum_{i=1}^n EVM_{DMRS,i}^2}$$

In the determination of each  $EVM_{DMRS,i}$ , the timing is set to  $\Delta \tilde{t} = \Delta \tilde{t}_l$  if  $\overline{EVM}_l > \overline{EVM}_h$ , and it is set to  $\Delta \tilde{t} = \Delta \tilde{t}_h$  otherwise, where  $\overline{EVM}_l$  and  $\overline{EVM}_h$  are the general average EVM values calculated in the same  $n$  slots over which the intermediate average  $\overline{EVM}_{DMRS}$  is calculated. Note that in some cases, the general average EVM may be calculated only for the purpose of timing selection for the demodulation reference signal EVM.

Then the results are further averaged to get the EVM for the demodulation reference signal,  $EVM_{DMRS}$ ,

$$EVM_{DMRS} = \sqrt{\frac{1}{6} \sum_{j=1}^6 \overline{EVM}_{DMRS,j}^2}$$

The PRACH EVM,  $EVM_{PRACH}$ , is averaged over 2 preamble sequence measurements for long preamble formats as defined in Table 6.3.3.1-1 in [6] and averaged over 10 preamble sequence measurements for short preamble formats as defined in Table 6.3.3.1-2 in [6].

The EVM requirements shall be tested against the maximum of the RMS average at the window  $W$  extremities of the EVM measurements:

Thus  $\overline{EVM}_{PRACH,l}$  is calculated using  $\Delta \tilde{t} = \Delta \tilde{t}_l$  and  $\overline{EVM}_{PRACH,h}$  is calculated using  $\Delta \tilde{t} = \Delta \tilde{t}_h$ .

Thus we get:

$$EVM_{PRACH} = \max(\overline{EVM_{PRACH}}, \overline{EVM_{PRACH}})$$

## F.7 Spectrum Flatness

The data shall be taken from FFT coded data symbols and the demodulation reference symbols of the allocated resource block.

## F.8 EVM measurement for 2Tx

For UE with dual transmission antennas, if UE indicates IE [*txDiversity-r16*], EVM is measured at each antenna connector to get  $EVM_1$  and  $EVM_2$ , and the total EVM is calculated by values of  $EVM_1$  and  $EVM_2$  with weighting factor of linear power at each antenna connector.

$$EVM = \frac{P_1 * EVM_1 + P_2 * EVM_2}{P_1 + P_2}$$

where  $P_1$  and  $P_2$  denote the linear power measured at each antenna connector respectively.

## F.9 Phase offset measurement for DMRS bundling

### F.9.1 Measurement point

The measurement point for phase offset measurement is defined in Figure F.9.1-1.

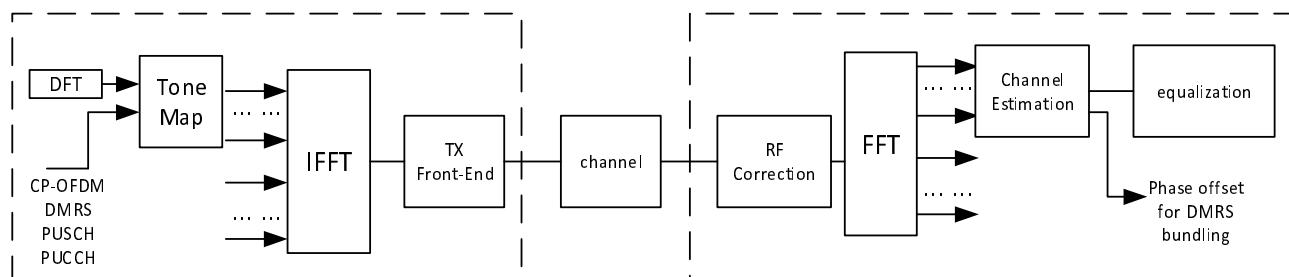


Figure F.9.1-1: Measurement point for phase offset for DMRS bundling

### F.9.2 Symbols used

Phase offset is determined based on DMRS REs (3 DMRS symbols per slot) with the option to use data symbols.

### F.9.3 Modified test signal

Same as described in Annex F.4.

## F.9.4 Phase offset measurement

The phase offset measurement is based on the phase response of the Tx chain  $\tilde{\varphi}(t, f)$  as derived based on Annex F.4.

The subcarrier at the carrier leakage frequency of the transmitted signal shall be excluded from the measured subcarriers.

The phase difference  $\Delta\tilde{\varphi}(f)$  for each measured subcarrier between a reference timeslot  $t_{ref}$  and the measurement timeslot  $t_m$  is then calculated as defined below.

$$\Delta\tilde{\varphi}(f) = \tilde{\varphi}(t_m, f) - \tilde{\varphi}(t_{ref}, f)$$

The phase offset between the reference and measurement timeslots are then calculated as the maximum over the results for all measured subcarriers as shown below:

$$PhaseOffset = \max_f (|\Delta\tilde{\varphi}(f)|)$$

## F.10 EVM for UL MIMO

### F10.1 General

EVM for UL MIMO is measured per layer. A zero-forcing (ZF) MIMO receiver architecture is used so that dual layer transmissions by the UE can be demodulated by the test equipment receiver.

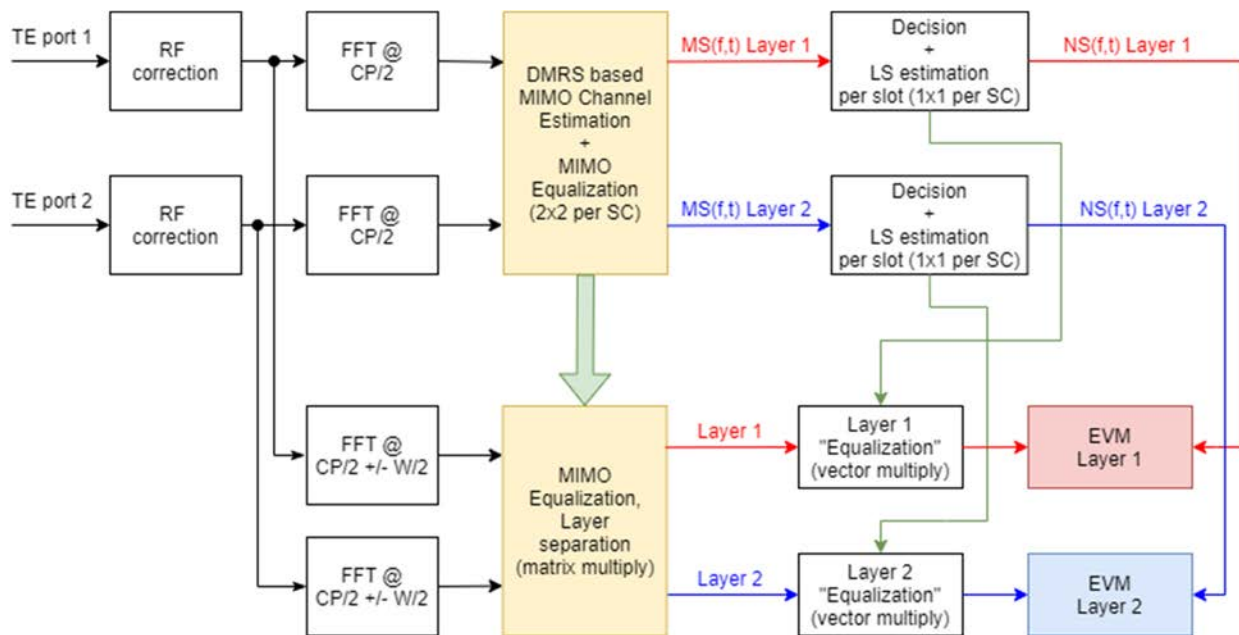


Figure F.10.1-1: EVM calculation block diagram for 2-Layer UL MIMO

The TE receives signals from 2 different ports which are connected to two antenna connectors in the test system.

For UL MIMO measurements a MIMO equalization step as described in section F.10.2 is performed to separate the layers.

Each layer is then processed as described in section F.10.3 to receive the measurement results for each individual layer.

## F10.2 MIMO Equalization

The MIMO equalization is based only on reference signals (DMRS) without using any data symbols. For the equalization process all available DMRS symbols shall be used.

The effective 2x2 channel matrix is estimated using reference signals of different subcarriers, e.g. in case of DMRS antenna ports 0 and 2. In case that same subcarriers are used, e.g. DMRS antenna ports 0 and 1, a channel decomposition is necessary taking advantage of the orthogonal codes  $w_f$  and  $w_t$  and assuming identical channel coefficients for adjacent subcarriers of same CDM group.

Effective channel including the precoding matrix  $P$  is:

$$\tilde{H} = HP = \begin{bmatrix} \tilde{h}_{0,0} & \tilde{h}_{0,1} \\ \tilde{h}_{1,0} & \tilde{h}_{1,1} \end{bmatrix}$$

with

$$\tilde{h}_{n,v} = \frac{y_n r_v^*}{|r_v|^2}$$

where  $y$  denotes the received symbol on port index  $n$  and  $r$  the reference signal for layer index  $v$ .

Since reference signals of a specific layer are transmitted only on subcarriers of one CDM group channel, interpolation is needed in order to obtain channel coefficients for all subcarriers. Channel interpolation is done using the channel coefficients of active CDM group in all other CDM groups.

The channel coefficients used to calculate the equalizer coefficients are obtained after channel smoothing in frequency domain by computing the moving average of interpolated channel coefficients. The moving average window size is 7. For subcarriers at or near the edge of allocation the window size is reduced accordingly.

The ZF equalizer coefficients are calculated as the inverse of the effective channel matrix, in general:

$$G_{ZF} = \tilde{H}^{-1}$$

## F10.3 Layer processing

After performing the MIMO equalization as described in section F.10.2 each layer is processed using the existing procedure as defined in Annex E of TS 38.521-1 [4].

Since the channel estimation is calculated only on the DMRS symbols, an averaging including all 14 symbols of one slot, i.e. data and reference signals, is needed in order to minimize EVM. The averaging is achieved by the least square (LS) equalization method described for single layer in Annex E.3. of TS 38.521-1 [4].

$MS(f,t)$  and  $NS(f,t)$  are processed with a LS estimator, to derive one equalizer coefficient per time slot and per allocated subcarrier.  $EC(f)$  is defined for each layer as:

$$EC_v(f) = \frac{\sum_{t=0}^{13} NS_v(f, t)^* NS_v(f, t)}{\sum_{t=0}^{13} MS_v(f, t)^* NS_v(f, t)}$$

With  $*$  denoting complex conjugation.  $EC(f)$  are used to equalize layer data symbols.

EVM equalizer spectral flatness is derived from equalizer coefficients for each layer as follows:

$$c_v = |EC_v(f)| \sqrt{|g_{v,0}|^2 + |g_{v,1}|^2}$$

## Annex G (normative): Difference of relative phase and power errors

### G.0 General

This annex gives further information needed for understanding and implementing 6.4D.4. The following terms should be understood as follows:

**Relative phase error:** refers to the phase difference between signals at different antenna connectors, which should be ideally 0. It should be understood as for a slot i.e. (slot) relative phase. It is calculated based on DMRS symbols of that slot or on SRS symbols.

**Difference of relative phase error:** refers to the difference between the relative phase error determined per slot and the relative phase error determined based on the SRS transmitted.

### G.1 Measurement Point

Figure G.1-1 shows the measurement point for the difference of relative phase and power errors.

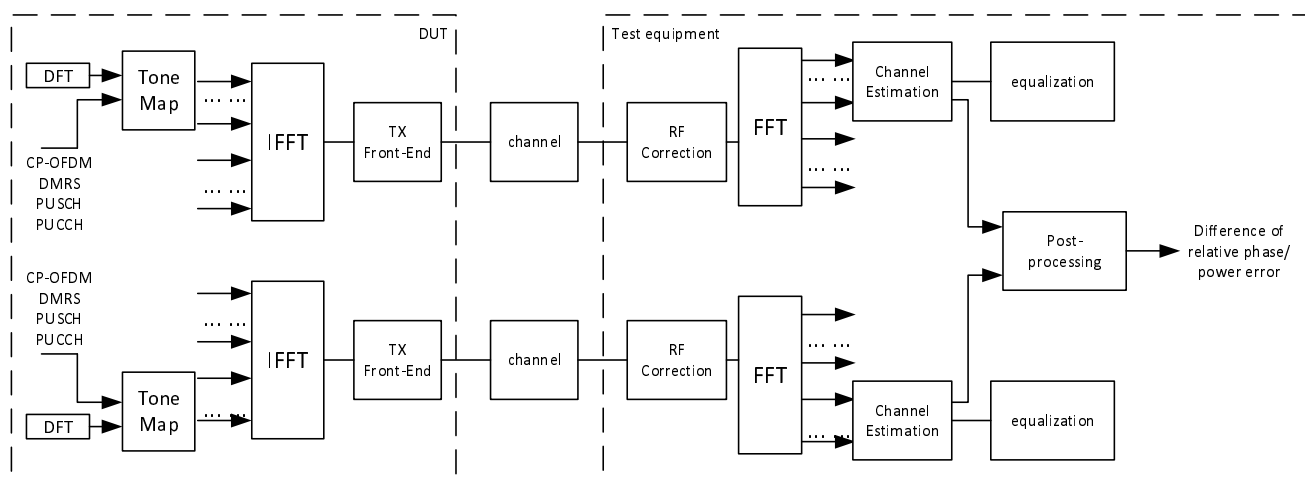


**Figure G.1-1 - Measurement point for difference of relative phase/power error for UL coherent MIMO**

### G.2 Relative Phase Error Measurement

Here are listed the different aspects that may lead to different interpretations.

#### G.2.1 Symbols and subcarriers used

Phase error is determined based on DMRS REs (DMRS mapping type A with 3 DMRS symbols per slot, the REs corresponding to the odd subcarriers and DMRS symbols are non-allocated for data or DMRS.) and SRS REs (with 4 SRS symbols in the SRS slot, same SRS resource mapping is used for non-codebook-based and codebook-based precoding).

For the DMRS and SRS to occupy identical SCs and maximize their frequency density, DMRS configuration type 1 and SRS comb2 configuration are used.

UL RMC described in Annex A.2 is used.

## G.2.2 CFO (carrier frequency offset) correction

The TE performs a CFO correction on a slot-by-slot basis using a common frequency correction at the two uplink antenna connectors.

## G.2.3 Steps of the measurement method

Below are detailed the steps necessary to obtain the maximum difference of relative phase error during the 20ms time window.

- 1 Determination for each subcarrier and at each antenna, the SRS relative phase error based on the last SRS transmitted on Ant1 and Ant2, that relative phase error serves as a reference for the calculation of the difference of relative phase error for each slot inside the 20 ms time window.

The output is the “SRS relative phase error” vector for the last SRS transmitted:  $[1 \times \text{number\_of\_subcarriers}]$ .

- 2 Calculation for the last SRS transmitted, for each RB of the SRS relative phase errors based on the arithmetic mean of the subcarrier SRS relative phase errors determined in previous step.

The output is the “SRS relative phase error” vector for the last SRS transmitted:  $[1 \times \text{number\_of\_RBs}]$ .

- 3 CFO correction on slot-by-slot basis using a common frequency correction for both antenna outputs.

- 4 Determination for each subcarrier and at each antenna, the phase over the slot being analyzed. The phase is extracted from the channel estimate derived from the 3 DMRS symbols of the slot using the LSE technique.

The output is one vector of dimension  $[1 \times \text{number\_of\_subcarriers}]$  for each antenna.

- 5 Calculation for a slot for each subcarrier of the relative phase error (difference between the vectors determined in the previous step).

The output is subcarrier relative phase errors of a slot:  $[1 \times \text{number\_of\_subcarriers}]$ .

- 6 Calculation for a slot, for each RB of the relative phase errors based on the arithmetic mean of the subcarrier relative phase errors determined in previous step.

The output is a “slot relative phase error” vector for a slot:  $[1 \times \text{number\_of\_RBs}]$ .

- 7 Calculation for a slot of the difference of relative phase errors based on the “SRS relative phase error” (reference) determined in step 2 and the “slot relative phase error” determined in previous step.

The output is a “difference of relative phase error” vector for a slot:  $[1 \times \text{number\_of\_RBs}]$ .

- 8 Calculation for a slot of the arithmetic mean value of the “difference of relative phase error” vector determined in previous step, this value corresponds to an RB.

The output is a “difference of relative phase error” value for a slot:  $[1 \times 1]$ .

- 9 Perform for each slot of the 20ms time window, steps 3 to 8.

The output is a “difference of relative phase error” vector:  $[1 \times \text{number\_of\_slots}]$ .

- 10 Calculation of the maximum value of the “difference of relative phase error”.

The output is the “difference of relative phase error” that should be verified as complying with the 40° maximum allowable difference of relative phase error requirement:  $[1 \times 1]$ .



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## Annex H (informative): Void

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## Annex I (informative): Void

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## Annex J (informative): Void

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## Annex K (informative): Void

## Annex L (normative): ModifiedMPR-Behavior

### L.1 Indication of modified MPR behavior

This annex contains the definitions of the bits in the field *modifiedMPR-Behavior* indicated per supported NR band in the IE *RF-Parameters* [7] by a UE supporting an MPR or A-MPR modified in a given version of this specification. A modified MPR or A-MPR behaviour can apply to a supported NR band in stand-alone operation (including CA and NN-DC operation) or in non-standalone operation with the said NR band as part of an EN-DC or NE-DC band combination.

NOTE 1: In the present release, the *modifiedMPR-Behavior* is indicated [7] by an 8-bit bitmap per supported NR band.

**Table L.1-1: Definitions of the bits in the field *modifiedMPR-Behavior***

| NR Band | Index of field<br>(bit number) | Definition<br>(description of the supported functionality if indicator<br>set to one)                                                                                                                              | Notes                                                                                                                                                                                                                                                                                                                                                |
|---------|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| n30     | 0 (leftmost bit)               | Requirements for network signalling value NS_21 as defined in Clause 6.5.2.3.y of 38.101-1 v17.6.0 and A-MPR as defined in Clause 6.2.3.14 of 38.101-1 v17.6.0.                                                    | This bit shall be set to 1 by a UE supporting the Rel-17 version of the specification. If the bit is not set, then requirements for NS_21 as defined in Clause 6.5.2.3.3 of 38.101-1 v16.11.0 and A-MPR as defined in Clause 6.2.3.14 of 38.101-1 v16.11.0 apply.                                                                                    |
| n41     | 0 (leftmost bit)               | EN-DC contiguous intraband MPR as defined in clause 6.2B.2.1 of 38.101-3 v15.5.0                                                                                                                                   | - This bit shall be set to 1 by a UE supporting DC_(n)41AA UE EN-DC                                                                                                                                                                                                                                                                                  |
|         | 1                              | EN-DC non-contiguous intraband MPR as defined in clause 6.2B.2.2 of 38.101-3 v15.5.0                                                                                                                               | - This bit shall be set to 1 by a UE supporting DC_41A_n41A EN-DC                                                                                                                                                                                                                                                                                    |
|         | 2                              | EN-DC contiguous and non-contiguous intraband MPR and A-MPR as defined in 38.101-3 v16.4.0. If this bit is not set the UE uses Rel-15 MPR or A-MPR for EN-DC contiguous and non-contiguous intraband MPR and A-MPR | - This bit may be set to 1 by a UE supporting DC_(n)41AA or DC_41A_n41A EN-DC                                                                                                                                                                                                                                                                        |
|         | 3                              | PC 1.5 MPR as defined in Table 6.2D.2-3                                                                                                                                                                            | This bit may be set to 1 by a UE of any release supporting power class 1.5. This bit is intended to be set by larger form factor FWA devices. If the bit is not set for a Rel-17 and later UE, PC 1.5 MPR as defined in Table 6.2D.2-2 applies. If the bit is not set for a Rel-16 and earlier UE, MPR in Table 6.2.2-4 of 38.101-1 v16.5.0 applies. |
| n71     | 0 (leftmost bit)               | EN-DC contiguous intraband MPR as defined in clause 6.2B.2.1 of 38.101-3 v15.5.0                                                                                                                                   | - This bit shall be set to 1 by a UE supporting DC_(n)71AA UE EN-DC                                                                                                                                                                                                                                                                                  |
| n77     | 0 (leftmost bit)               | PC 1.5 MPR as defined in Table 6.2D.2-3                                                                                                                                                                            | This bit may be set to 1 by a UE of any release supporting power class 1.5. This bit is intended to be set by larger form factor FWA devices. If the bit is not set for a Rel-17 and                                                                                                                                                                 |

|     |                  |                                         |                                                                                                                                                                                                                                                                                                                                                      |
|-----|------------------|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     |                  |                                         | later UE, PC 1.5 MPR as defined in Table 6.2D.2-2 applies. If the bit is not set for a Rel-16 and earlier UE, MPR in Table 6.2.2-4 of 38.101-1 v16.5.0 applies.                                                                                                                                                                                      |
| n78 | 0 (leftmost bit) | PC 1.5 MPR as defined in Table 6.2D.2-3 | This bit may be set to 1 by a UE of any release supporting power class 1.5. This bit is intended to be set by larger form factor FWA devices. If the bit is not set for a Rel-17 and later UE, PC 1.5 MPR as defined in Table 6.2D.2-2. If the bit is not set for a Rel-16 and earlier UE, MPR in Table 6.2.2-4 of 38.101-1 v16.5.0 applies.         |
| n79 | 0 (leftmost bit) | PC 1.5 MPR as defined in Table 6.2D.2-3 | This bit may be set to 1 by a UE of any release supporting power class 1.5. This bit is intended to be set by larger form factor FWA devices. If the bit is not set for a Rel-17 and later UE, PC 1.5 MPR as defined in Table 6.2D.2-2 applies. If the bit is not set for a Rel-16 and earlier UE, MPR in Table 6.2.2-4 of 38.101-1 v16.5.0 applies. |

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## Annex M (normative): Declared Supported Post Antenna Gain for UE

### M.1 FRMCS operating bands

Due to large form factor of the FRMCS (Future Railway Mobile Communication System) rooftop mounted cab-radio unit, UE in bands n100 and n101 can have external antenna placed far away from the chipset unit. In this case, the effective antenna gain is a UE specific condition. This effective antenna gain includes the feeding loss of all components after the chipset unit antenna connector and the peak directional gain of the external antenna and hence will be called the post connector gain  $G_{n100\text{post connector}}$  and  $G_{n101\text{post connector}}$  for band n100 and n101, respectively.

The 3GPP specifications mandate UE manufacturer declarations of the supported value of the post connector gain  $G_{n100\text{post connector}}$  and  $G_{n101\text{post connector}}$  as a way to accommodate the requirement without putting requirements on the UE specific condition. If external antenna is not used, the value of 0dBi will be used.

The applicable regional requirements for bands n100 and n101 in  $P_{\text{EIRP}}$  shall be converted to conducted requirements by subtracting  $G_{n100\text{post connector}}$  or  $G_{n101\text{post connector}}$  as:

$$P_{\text{Conducted}} = P_{\text{EIRP}} - G_{n100\text{post connector}} \text{ for band n100, and}$$

$$P_{\text{Conducted}} = P_{\text{EIRP}} - G_{n101\text{post connector}} \text{ for band n101.}$$

## Annex N (informative): Change history

| Change history |             |            |      |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |             |
|----------------|-------------|------------|------|-----|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| Date           | Meeting     | TDoc       | CR   | Rev | Cat | Subject/Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | New version |
| 2017-08        | RAN4#84     | R4-1708909 |      |     |     | Initial Skeleton                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0.0.1       |
| 2017-10        | RAN4#84 Bis | R4-1709958 |      |     |     | Added approved TPs in RAN4-NR-AH#3<br>R4-1709948, TP for TS 38.101-1: minimum output power, Huawei<br>R4-1709454, TP for TS 38.101-1:UE Tx spurious emission for range 1, ZTE Corporation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0.1.0       |
| 2017-10        | RAN4#84 Bis | R4-1711978 |      |     |     | Embedded approved TPs in RAN4#84Bis<br>R4-1711556, "TP to TS 38.101: Draft CR to Transmitter power clause", Nokia<br>R4-1710962, "TP to TS 38.101-1: Draft CR to Output RF spectrum emissions" Nokia<br>R4-1711608, "TP for TS38.101-1 on conducted UE transmitter intermodulation for FR1(section 6.5)" ZTE Corporation<br>Number of TPs by editors                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 0.2.0       |
| 2017-12        | RAN4#85     | R4-1713805 |      |     |     | Approved TPs in RAN4#85<br>R4-1713204, TP on general parts for 38.101-1 NR FR1, Ericsson<br>R4-1714047, WF on MPR for sub6GHz, NTT DOCOMO, INC.<br>R4-1714052, TP for TS 38.101-1 introduction of band n71 for transmitter characteristics, T-Mobile USA Inc.<br>R4-1714162, TP to 38.101-1: ACS, Ericsson<br>R4-1714163, TP to 36.101-1: In-band blocking, Ericsson<br>R4-1714446, TP to 36.101-1: Out-of-band blocking and exceptions for spurious response, Ericsson<br>R4-1714369, TP for NBB requirement for FR1, Intel Corporation<br>R4-1714529, TP on introducing operating bands for NR-LTE DC including SUL band combinations in 38.101-1, Huawei<br>R4-1714097, TP for TS 38.101-1: UE RF requirements for standalone SUL, Huawei<br>R4-1714536, TP for TS 38.101-1: Channel Bandwidth Definition, Qualcomm Incorporated (Note, this TP was further discussed and edited in the reflector)<br>R4-1714114, TP for TS 38.101-1: Channel Arrangement, Qualcomm Incorporated (Note, this TP was further discussed and edited in the reflector)<br>R4-1714029, Sub6 Reference Sensitivity, Qualcomm Incorporated<br>R4-1714329, TP to TR 38.101-01 v0.2.0: ON/OFF mask design for NR UE transmissions for FR1, Ericsson<br><br>Band list according to R4-1714542, List of bands and band combinations to be introduced into RAN4 NR core requirements by December 2017, RAN4 Chairmen<br>Input from:<br>R4-1714479, TP for TR 38.817-01 NR channel bandwidth, Huawei, HiSilicon | 0.3.0       |
| 2017-12        | RAN4#85     | R4-1714569 |      |     |     | Further corrections and alignments with 38.104 after email review                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0.4.0       |
| 2017-12        | RAN#78      | RP-172475  |      |     |     | v1.0.0 submitted for plenary approval. Contents same as 0.4.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 1.0.0       |
| 2017-12        | RAN#78      |            |      |     |     | Approved by plenary – Rel-15 spec under change control                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 15.0.0      |
| 2018-03        | RAN#79      | RP-180264  | 0003 |     | F   | Implementation of endorsed CRs to 38.101-1<br>Endorsed draft CRs<br>F: R4-1800400, Editorial corrections for 38.101-1, Qualcomm<br>B: R4-1801102, Draft CR for 30 MHz CBW support, Huawei<br>F: R4-1800032, 38.101-1 n71 draft CR for section 6.2.3 - UE A-MPR - NS values, T-Mobile USA Inc.<br>B: R4-1801121, Draft pCR for TS 38.101-1 version 15.0.0:<br>Remaining ON/OFF masks for FR1 NR UE transmissions, Ericsson<br>F: R4-1800417, Correction of NR SEM table and additional requirements table, vivo<br>F: R4-1800033, 38.101-1 n71 draft CR for section 6.5.3.2 Spurious emissions for UE co-existence, T-Mobile USA Inc.<br>F: R4-1801114, Proposal on protected band numbering in UE specs, Sprint Corporation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 15.1.0      |



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|         |        |           |      |   | <p>F: R4-1800407, Draft CR for TS 38.101-1: Mandatory 4Rx antenna performance for NR UE, Vodafone Group Plc</p> <p>F: R4-1800451 Draft CR for TS 38.101-1: Clarification of 4Rx NR bands, Huawei, HiSilicon</p> <p>F: R4-1801136, Draft CR for TS 38.101-1: REFSENS for NR bands, Huawei, HiSilicon</p> <p>F: R4-1801137, Draft CR: n71 REFSENS, Dish Network</p> <p>F: R4-1800395, Draft CR to 38.101-1: corrections to ACS and in-band blocking, Ericsson</p> <p>F: R4-1800396, Draft CR to 38.101-1: corrections to out-of-band blocking, Ericsson</p> <p>F: R4-1800397, Draft CR to 38.101-1: corrections to spurious response, Ericsson</p> <p>F: R4-1800305, Draft CR for NR FR1 wide band intermodulation requirements, MediaTek Inc.</p> <p>F: R4-1800320, Draft CR to 38.101-1: Rx Spurious emission for NR FR1 (section 7.9), ZTE Corporation</p> <p>F: R4-1800473, Draft CR on UE RF requirements for SUL in TS 38.101-1, Huawei</p> <p>F: R4-1800965, Draft CR to TS 38.101-1: Asymmetric CH BW operation, Dish Network</p> <p>F: R4-1800882, Draft CR for correction of UE channel bandwidth for Bands n77 and n78 for TS 38.101-1, Orange UK</p> <p>F: R4-1801012, Draft CR to 38.101-1: Clarifications to UE spectrum utilization section 5.3, Ericsson</p> <p>F: R4-1800030, 38.101-1 n71 draft CR for section 5.4.4 - TX-RX frequency separation, T-Mobile USA Inc</p> <p>F: R4-1801228, Draft CR to 38.101-1: Channel spacing for CA for NR FR1(section 5.4.1.2), ZTE Corporation</p> <p>F: R4-1801231, Correction CR for channel spacing:38.101-1, Samsung</p> <p>F: R4-1801235, Draft CR to TS 38.101-1: Corrections on channel raster calculation in section 5.4.2, ZTE Corporation</p> <p>F: R4-1801318, Draft CR on synchronization raster, Huawei</p> <p>RAN4#86:</p> <p>R4-1803053, Draft CR for new spec structure of 38.101-1, Ericsson</p> <p>R4-1801479, Draft CR to 38.101-1: Default Tx-RX frequency separation for NR FR1(section 5.4.4), ZTE</p> <p>R4-1801581, Draft CR for TS 38.101-1 update of 4Rx bands, Huawei Technologies France</p> <p>R4-1802211, draft CR TS 38.101-1 Uplink configuration for FR1 NR REFSENS, Skyworks Solutions Inc.</p> <p>R4-1802342, Draft CR for NR FR1 ACS case 2 transmitter power setting correction (Note 1), MediaTek Inc.</p> <p>R4-1802509, Draft CR on 38.101-1 v15.0.0: Remaining ON/OFF masks for FR1 NR UE transmissions, Ericsson</p> <p>R4-1802566, Draft CR to TS 38.101-1: Clarification of mixed numerology guardband size, Ericsson</p> <p>R4-1802978, Draft CR to TS 38.101-1: Corrections on channel raster in Section 5.4.2.3, Intel Corporation</p> <p>R4-1803064, Draft CR for 38.101-1: Correction of errors, Sprint Corporation</p> <p>R4-1803065, Draft CR for 38.101-1 Introduction of n41requirements, Sprint Corporation</p> <p>R4-1803242, Draft CR to 38.101-1: Corrections to n66, Dish Network</p> <p>R4-1803285, Draft CR to 38.101-1: Correction to CH BWs without symmetric uplink Dish Network, Skyworks Solutions Inc.</p> <p>R4-1803436, Introduction of UL subcarrier alignment for additional bands, AT&amp;T</p> <p>R4-1803456, Draft CR for 38.101-1: Spurious Emissions for UE Coexistence, Sprint Corporation</p> <p>R4-1803461, CR on configured transmitted power for TS 38.101-1, Huawei</p> <p>R4-1803452, draft CR for introduction of completed band combinations from 37.865-01-01 into 38.101-1, Ericsson</p> <p>R4-1803567, Draft CR for TS 38.101-1: Sync raster offset in re-farming bands (5.4.3), Ericsson</p> <p>R4-1803365, CR to introduce MPR for PC2 and PC3 and A-MPR for UTRA protection, Nokia</p> |        |
| 2018-06 | RAN#80 | RP-181262 | 0011 | F | <p>CR to TS 38.101-1: Implementation of endorsed draft CRs from RAN4 #86bis and RAN4 #87</p> <p>R4-1803900, Draft CR into TS 38.101-1 Introduction of band combinations for SUL, Huawei</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 15.2.0 |

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|  |  |  |  |  | <p>R4-1804021 CR for clarifications for NR FR1 CA BW Classes Nokia, Nokia Shanghai Bell</p> <p>R4-1804140 CR for Narrow Band Blocking requirement for FR1 Intel Corporation</p> <p>R4-1804219 Draft CR for 38.101-1: n41 SEM and additional spurious emissions SPRINT Corporation</p> <p>R4-1804266 Draft CR to 38.101-1 MPR channel bandwidth criteria Skyworks Solutions Inc.</p> <p>R4-1804267 Draft CR to 38.101-1 n3,n5,n8 REFSENS levels Skyworks Solutions Inc.</p> <p>R4-1804268 Draft CR to 38.101-1: Correction to n41 uplink configuration for reference sensitivity Skyworks Solutions Inc.</p> <p>R4-1804370 Draft CR to add missing NR inter-band DL CA in FR1 for TS 38.101-1 NTT DOCOMO, INC.</p> <p>R4-1804581 Draft CR to 38.101-1: On EVM Wording Qualcomm, Inc.</p> <p>R4-1804948 Corrections to 5.3.3 in TS 38.101-1 Nokia, Nokia Shanghai Bell</p> <p>R4-1804877 draft CR introduction completed band combinations 37.865-01-01 -&gt; 38.101-1 Ericsson</p> <p>R4-1805444 Draft CR to TS 38.101-1: Asymmetric CH BW operation Dish Network</p> <p>R4-1805447 drfat CR for including SRS antenna switching in configured output power Qualcomm Incorporated</p> <p>R4-1805462 Editorial corrections to UE RF requirements in 38.101-1 Qualcomm Incorporated</p> <p>R4-1805659 Draft CR for CBW for n50 for 38.101-1 Huawei</p> <p>R4-1805664 Draft CR to 38.101-1: Addition of Annex F Rohde &amp; Schwarz</p> <p>R4-1805665 Correction to inner and outer definitions for MPR Qualcomm Incorporated</p> <p>R4-1805684 Draft CR to TS38.101-1: Channel Raster to Resource Element Mapping (Section 5.4.2.2) and RB alignment with different numerologies (Section 5.3.4) ZTE Corporation</p> <p>R4-1805698 Draft CR for 38.101-1 for Rx(Ch7) of Band n77, n78 and n79 RF requirements CMCC</p> <p>R4-1805699 Draft CR to 38.101-1:introduction of Tx/Rx requirements for inter-band CA ZTE Corporation</p> <p>R4-1805751 Draft CR on UE-to-UE coexistence requirements to protect band 29 from NR band 71 LG Electronics France</p> <p>R4-1805783 Draft CR for 38.101-1 for Tx(Ch6) of Band n77, n78 and n79 RF requirements CMCC</p> <p>R4-1805902 Draft CR into TS 38.101-1 Correction on SUL_n78-n80Huawei, HiSilicon</p> <p>R4-1805904 Draft CR into TS 38.101-1 Introduction of new band combinations for SUL Huawei, HiSilicon</p> <p>R4-1805921 Draft CR on NR UE REFSENS SNR FRC for FR1 Intel Corporation</p> <p>R4-1805981 Draft CR for TS38.101-1:Sync raster Samsung</p> <p>R4-1804548 Draft CR for CA BW class for FR1 NTT DOCOMO, INC.</p> <p>R4-1806170 Draft CR on frequency error for TS 38.101-1 ZTE Corporation</p> <p>R4-1806481 Draft CR for Environmental conditions in TS 38.101-1 Annex NTT DOCOMO, INC.</p> <p>R4-1806657 Draft CR to 38.101-1: Measurement BW for min and off power Skyworks Solutions Inc.</p> <p>R4-1806669 Draft CR to TS38.101-1_introduction of completed band combinations for inter-band 2UL CA ZTE Corporation</p> <p>R4-1806673 Draft CR to TS38.101-1_Remove brackets from Tx and Rx spurious emission table ZTE Corporation</p> <p>R4-1806677 Draft CR on including CA bandwidth class and band combinations for intra-band CA LG Electronics France</p> <p>R4-1806719 Introduction of 7.5 kHz frequency shift for Band n71 Ericsson, T-Mobile</p> <p>R4-1806844 Draft CR for 38.101-1 for Tx(Ch6): missing maximum power requirements for n1 and n8 SoftBank Corp.</p> <p>R4-1806945 Draft CR for TS 38.101-1: Channel raster and NR-ARFCN clarification (5.4.2) Ericsson</p> <p>R4-1807039 Intra-band CA terminology for UE ZTE Corporation</p> <p>R4-1807178 Corrections to n70 TX/RX frequency separation Dish Network</p> <p>R4-1807181 Corrections to spurious emissions UE co-existence table Dish Network</p> <p>R4-1807234 Draft CR into TS 38.101-1 Some Corrections for SUL Huawei, HiSilicon</p> |  |
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|         |        |           |      |   | <p>R4-1807269 Corrections to Wide band intermodulation table &lt;2700MHz Dish Network</p> <p>R4-1807392 to remove the brackets for SU in 38.101-1 Huawei, HiSilicon</p> <p>R4-1807647 Draft CR to TS 38.101-1: Correction to Asymmetric CH BW operation Dish Network</p> <p>R4-1807680 Draft CR on 38.101-1 on channel raster to achieve alignment of data and SSB subcarrier grids Nokia, Nokia Shanghai Bell, Ericsson</p> <p>R4-1807705 CR for TS 38.101-1 A-MPR for n51 Huawei, Hisilicon</p> <p>R4-1807814 Draft CR for 38.101-1: SEM correction for n41 Sprint Corporation</p> <p>R4-1807851 Draft CR for 38.101-1: UE spurious emission protection requirements for n5 Sprint Corporation</p> <p>R4-1807920 General requirements for downlink inter-band CA Qualcomm Incorporated</p> <p>R4-1807923 Resolution bandwidth for ACLR Qualcomm Incorporated</p> <p>R4-1808084 Introduction of n12 into TS 38.101-1 Nokia</p> <p>R4-1808087 Draft CR 38.101-1: Introduction of n2, n25, n66 and n70 Sprint Corporation, Dishnetwork</p> <p>R4-1808090 Draft CR to TS 38.101-1: Inclusion of Simultaneous RxTx UE capability for some band combinations Ericsson, Vodafone, Orange</p> <p>R4-1808107 Draft CR to TS38.101-1_corrections on UE coexistence ZTE Corporation</p> <p>R4-1808111 TP to TS38.101-1 - UE ON/OFF masks Ericsson</p> <p>R4-1808116 Draft CR to 38.101-1: introduction of Band n34,n39 and n40 RF requirements ZTE Corporation,CMCC</p> <p>R4-1808136 Draft CR to 38.101-1: FR1 UE Power Control Qualcomm Incorporated</p> <p>R4-1808141 Correction to MPR for PC2 and spectrum emission mask measurement bandwidth Qualcomm Incorporated</p> <p>R4-1808142 Draft CR for 38.101-1 n41 A-MPR Sprint Corporation, Nokia, Nokia Shanghai Bell, Ericsson</p> <p>R4-1808143 Draft CR for TS 38.101-1 A-MPR for n20 Huawei, HiSilicon</p> <p>R4-1808155 Draft CR for TS 38.101-1: to correct requirements for n71 Samsung</p> <p>R4-1808178 Addition parameters about n50 &amp; n51 in TS 38.101-1 Huawei, Hisilicon, Etisalat (editors note: n50 not implemented per chairmans agreement)</p> <p>R4-1808182 Draft CR for TS 38.101-1 A-MPR for n28 Huawei, HiSilicon</p> <p>R4-1808187 CR for RF requirements for Coherent UL MIMO for FR1 Qualcomm Austria RFFE GmbH</p> <p>R4-1808207 Draft CR to 38.101-1: On EVM Averaging Length, Wording , Qualcomm</p> <p>R4-1808209 Draft CR for 38.101-1 for Tx (Ch6) of HPUE Qualcomm</p> <p>R4-1808466 Draft CR on UL RMC and OCNG pattern for FDD REFSSENS tests RD session</p> <p>R4-1808493 Draft CR for TS 38.101-1: Channel and sync raster corrections (5.4) Ericsson</p> <p>R4-1808507 Draft CR for TS38.101-1 on addition of new 90MHz UE CBW for n41/n78 LG Electronics Inc., LG Uplus, Samsung</p> <p>R4-1808176, Draft CR for 38.101-1 : Introduction of A-MPR for n8, SoftBank</p> <p>R4-1808201, Draft CR for 38.101-1 : Introduction of A-MPR for n1, SoftBank</p> <p>R4-1807101, draft CR introduction completed band combinations 37.865-01-01 -&gt; 38.101-1, Ericsson</p> |        |
| 2018-09 | RAN#81 | RP-181896 | 0025 | F | <p>Big CR for 38.101-1</p> <p>Endorced draft CRs from RAN4#NR-AH-1807</p> <p>R4-1809335, Draft CR on UL RMC for FR1 RF tests, Qualcomm Incorporated</p> <p>R4-1809337, Draft CR on NR UE REFSSENS SNR FRC for FR1, Intel Corporation</p> <p>R4-1809339, Draft CR on measurement of receiver characteristics for FR1 RF Tests, Qualcomm Incorporated</p> <p>R4-1809396, Draft CR on NR UE maximum input level FRC for FR1, Intel</p> <p>R4-1809567, Draft CR on OCNG pattern for FR1 REFSSENS tests, Qualcomm Incorporated, Rohde &amp; Schwarz</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 15.3.0 |

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|  |  |  |  |  | <p>Endorced draft CRs from RAN4#88</p> <p>R4-1809714, Draft CR to correct in-band blocking parameters for FR1, Anritsu Corporation</p> <p>R4-1809784, Draft CR to 38.101-1: Corrections on CA bandwidth classes for FR1, ZTE Corporation</p> <p>R4-1809785, Draft CR to TS 38.101-1 for Corrections on UE transmitter power, ZTE Corporation</p> <p>R4-1809793, Draft CR to 38.101-1: Corrections on additional spectrum emission mask, ZTE Corporation</p> <p>R4-1809919, Correction on UE receiver requirement for FR1, CATT</p> <p>R4-1810091, Draft CR TS 38.101-1 - UE ON-OFF mask clean up, Ericsson</p> <p>R4-1810210, Draft CR for TS 38.101-1: MPD inner and outer RB allocations formula correction, MediaTek, Inc.</p> <p>R4-1810229, Draft CR for TS 38.101-1: Spurious emission for UE coexistence table corrections, MediaTek, Inc.</p> <p>R4-1810230, Draft CR for TS38.101-1 to correct 90MHz UE CBW, LG Electronics, Inc.</p> <p>R4-1810232, Draft CR for TS 38.101-1: Table 7.3.2-1 n77 reference sensitivity corrections, MediaTek, Inc.</p> <p>R4-1810369, Draft CR to 38.101-1: Corrections on symbols and abbreviations in section 3, ZTE Corporation</p> <p>R4-1810376, Draft CR: General corrections to n71 requirements, Dish Network</p> <p>R4-1810428, Draft CR on TS38.101-1 for UE maximum output power for UL MIMO, OPPO</p> <p>R4-1810552, Correction of reference tables, OPPO</p> <p>R4-1810729, Draft CR for introduction of Band n74 for TS 38.101-1, NTT DOCOMO, Inc.</p> <p>R4-1810862, Draft CR to 38.101-1: Updates to Transmit Modulation Annex, Rohde &amp; Schwarz</p> <p>R4-1810892, CR to update Table 6.2D.1-2 for FR1, Qualcomm Incorporated</p> <p>R4-1810961, CR on ACS minimum requirement, Intel Corporation</p> <p>R4-1810965, CR on Out-of-Band Blocking minimum requirement, Intel Corporation</p> <p>R4-1810967, CR on Rx Intermodulation characteristics for CA, Intel Corporation</p> <p>R4-1810974, Annex lettering change for 38.101-1, Qualcomm Incorporated</p> <p>R4-1811189, CR to add more details to Coherent UL MIMO spec for FR1, Qualcomm Incorporated</p> <p>R4-1811280, Corrections of NR receiver characteristics titles, Vivo</p> <p>R4-1811455, Draft CR on DL Physical Channel for FR1 RF tests, Qualcomm Europe Inc. (Spain)</p> <p>R4-1811457, NS numbering, Qualcomm Incorporated</p> <p>R4-1811459, Correction on UE transmitter requirement for FR1, CATT</p> <p>R4-1811463, Draft CR for 38.101-1: Addition of missing NR CA configurations n8-n75 and n28-n75, VodafoneItalia SpA</p> <p>R4-1811472, Addition parameters about n51 in TS 38.101-1, Huawei, Hisilicon, Etisalat</p> <p>R4-1811474, CR CP- OFDM almost contiguous allocation, Nokia, Nokia Shanghai Bell</p> <p>R4-1811477, Draft CR to 38.101-1: FR1 Power Control, Qualcomm Incorporated</p> <p>R4-1811478, A-MPR correction for n20 and n28, Huawei, HiSilicon</p> <p>R4-1811490, Draft CR to 38.101-1: Addition of Carrier Leakage table, Rohde &amp; Schwarz</p> <p>R4-1811491, Draft CR for TS38.101-1 on transmit signal quality, OPPO</p> <p>R4-1811493, CR to TS 38.101-1: pi/2 BPSK with Spectrum Shaping, Indian Institute of Tech (M), Indian Institute of Tech (H), CEWiT, Nokia</p> <p>R4-1811513, A proposal on 2UL co-ex table modification, SoftBank Corp.</p> <p>R4-1811514, Draft CR to TS 38.101-1: Clarification on OCNG, Keysight Technologies UK Ltd</p> <p>R4-1811516, Draft CR on NR DL FRCs for FR1 UE RF requirements, Intel Corporation</p> <p>R4-1811550, Draft CR to TS 38.101-1 on channel bandwidth and spacing descriptions, Ericsson</p> <p>R4-1811553, Draft CR to 38.101-1: Corrections on description of channel raster entries, ZTE Corporation</p> <p>R4-1811783, Measurement period of PRACH time mask, CATT</p> |  |
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|         |        |           |      |   |   | <p>R4-1811792, Draft CR for A-MPR revision for n1, NTT DOCOMO, INC.</p> <p>R4-1811798, Draft CR for P<sub>max</sub> for FR1, Qualcomm Incorporated</p> <p>R4-1811799, P<sub>max</sub> for inter-band NR CA FR1 draft CR, InterDigital, Inc.</p> <p>R4-1811812, Draft CR to 38.101-1: On FR1 AMPR Band n41 NS_04, Qualcomm Incorporated</p> <p>R4-1811816, CR to update the definition of Long and Short subslot for FR1, Qualcomm</p> <p>R4-1811894, Addition parameters about n50 in TS 38.101-1, Huawei</p> <p>R4-1811896, Draft CR for TS 38.101-1: n41 GSCN range modification, MediaTek Inc.</p> <p>R4-1811285, Draft CR TS 38.101-1: NS_04 A-MPR' and spurious emission corrections, Sprint</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |        |
| 2018-12 | RAN#82 | RP-182836 | 0029 | 1 | F | <p>Endorsed draft CRs from RAN4#88Bis:</p> <p>R4-1812050, CR Simplification of NR NS_08, Nokia</p> <p>R4-1812054, Correction for Inter-band CA operating bands table in TS 38.101-1, Nokia.</p> <p>R4-1812079, draft CR to introduce asymmetric UL DL channel BW combinations for n71, T-Mobile USA Inc.</p> <p>R4-1812121, Draft CR on Note1 Corrections in 38.101 RX tests, Qualcomm</p> <p>R4-1812128, draftCR on 256QAM UL power requirement, Intel Corporation</p> <p>R4-1812200, Draft CR to TS 38.101-1 Add clarification note to PC3 MPR table, Intel Corporation</p> <p>R4-1812217, Draft CR to 38.101-1: Corrections on the descriptions of UE channel bandwidth for CA, ZTE Corporation</p> <p>R4-1812319, Draft CR for TS 38.101-1: REFSSENS UL configuration corrections, MediaTek Inc.</p> <p>R4-1812320, Draft CR for TS 38.101-1: Out-of-band blocking exceptions for CA, MediaTek Inc.</p> <p>R4-1812322, Draft CR for TS 38.101-1: Blocking characteristics for SUL, MediaTek Inc.</p> <p>R4-1812397, Clarification for almost contiguous CP-OFDM, Qualcomm Incorporated</p> <p>R4-1812508, Draft CR to 38.101-1: Corrections on channel raster &amp; SS raster for operating bands, ZTE Corporation</p> <p>R4-1812611, Draft CR to 38.101-1: Some corrections for inter-band CA combinations, ZTE Corporation</p> <p>R4-1813459, Draft CR for TS 38.101-1: Support 4Rx for n38, Huawei</p> <p>R4-1813469, draftCR on applicability of TDD configuratiin for CA in TS 38.101-1, Huawei</p> <p>R4-1813521, Addition of ?TC,c for single carrier P<sub>max</sub> for FR1, vivo</p> <p>R4-1813798, Draft CR to 38.101-1: Corrections on UE additional maximum output power reduction, ZTE Corporation</p> <p>R4-1813811, Draft CR to 38.101-1: Correction to n12 reference sensitivity power levels, Skyworks Solutions Inc.</p> <p>R4-1813812, Band n41 spurious emission limits, Qualcomm Incorporated</p> <p>R4-1813813, Draft CR for TS 38.101-1: P-Max for 5G NR HPUE, CMCC</p> <p>R4-1814158, CR on Spurious emissions for UE co-existence, Intel Corporation</p> <p>R4-1814159, Draft CR for CA ACS/IBB for Bandwidth class C, Qualcomm</p> <p>R4-1813843, Draft CR to 38.101-1: Update of Annex F, Rohde &amp; Schwarz</p> <p>R4-1813845, Correction for PI/2 PBK requirements, Nokia</p> <p>Endorsed draft CR's from RAN4#89</p> <p>R4-1815950, dCR on TS38.101-1 merging draft CRs from RAN4#88Bis, Qualcomm Incorporated</p> <p>R4-1814752, DraftCR to TS 38.101-1 pi/2 BPSK in n41, CMCC</p> <p>R4-1814824, n50 A-MPR, Qualcomm Incorporated</p> <p>R4-1814959, Changes to Max input power UL and DL configuratgions in FR1, OPPO</p> <p>R4-1814970, NR FR1 relative power tolerance CR, Nokia</p> <p>R4-1814972, A-MPR for NS_03 and NS_03U and re-formulation of NS_100, Nokia</p> <p>R4-1815060, draft CR for adding note about the fallback of NR CA in FR1 for TS 38.101-1, NTT DOCOMO, INC.</p> <p>R4-1815392, Draft CR to 38.101-1: Update to NS_04 requirements, Rohde &amp; Schwarz</p> | 15.4.0 |

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|         |        |           |      |   |   | <p>R4-1815563, Draft CR to 38.101-1 on Clarification on 7.5 KHz raster shift in NR re-farmed bands, Ericsson</p> <p>R4-1815863, Draft CR for 38.101-1: Nominal carrier spacing for 30 kHz raster, SPRINT Corporation</p> <p>R4-1815898, draft CR on CA configuration on bandwidth class F, Huawei</p> <p>R4-1815917, draftCR on DL RMC for TS 38.101-1, Huawei</p> <p>R4-1816162, Draft CR on introduction of SRS switch IL in FR1, OPPO</p> <p>R4-1816199, Draft CR on FR1-FR2 UE-to-UE coexistence for TS38.101-1, LG Electronics France</p> <p>R4-1816200, Draft CR to 38.101-1 on intra-band contiguous CA configurations for FR1, ZTE Corporation</p> <p>R4-1816240, Transient period for SRS Antenna Switching for FR1, Qualcomm</p> <p>R4-1816243, Draft CR to TS38.101-1 Clarifications on MSD and UL configuration tables for inter-band CA, ZTE Corporation</p> <p>R4-1816466, Draft CR on some changes for SUL band combinations to TS 38.101-1, Huawei</p> <p>R4-1816468, Support of 7.5 kHz carrier shift for additional operating bands, Ericsson</p> <p>R4-1816604, TDD configuration for UE Tx test in FR1, Ericsson</p> <p>R4-1816663, Draft CR to 38.101-1 (5.3.4) RB alignment, Huawei</p> <p>R4-1816755, CR to 38.101-1: ACS and IBB intra-band contiguous CA, Intel Corporation</p> <p>Further changes in RAN#82</p> <p>- 7.5 kHz frequency shift is specified for all FDD bands in clause 5.4.2.1</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |        |
| 2018-12 | RAN#82 | RP-182814 | 0030 | 2 | F | Company CR on 2Rx exception for NR vehicular UE at FR1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 15.4.0 |
| 2019-03 | RAN#83 | RP-190403 | 0034 |   | F | <p>CR to TS 38.101-1: Implementation of endorsed draft CRs from RAN4#90</p> <p>Endorced draft CR from Ran4#90</p> <p>R4-1900032, Editorial corrections for 38.101-1, Qualcomm Incorporated</p> <p>R4-1900031, draftCR on SRS IL for CA, Qualcomm Incorporated</p> <p>R4-1900161, CR on Relative power tolerance, Intel Corporation</p> <p>R4-1900162, CR on Minimum output power, Intel Corporation</p> <p>R4-1900274, Draft CR to TS 38.101-1 on NR general spectrum emission mask, ZTE Corporation</p> <p>R4-1900275, Draft CR to TS 38.101-1 on spurious emisssion for network signalled value NS_40, NS_41 and NS_42, ZTE Corporation</p> <p>R4-1900424, Correction of table references and other typos, Ericsson</p> <p>R4-1900508, Draft CR to TS 38.101-1 on UE transmitter power and some other editorial corrections, ZTE Corporation</p> <p>R4-1900723, Draft CR on editorial error of TS38.101-1, LG Electronics Inc.</p> <p>R4-1900727, Update to PRACH EVM window length for FR1, Rohde &amp; Schwarz</p> <p>R4-1900840, Draft CR for 38.101-1 modification of Transmit intermodulation requirement, Huawei</p> <p>R4-1900848, [RAN5 LS]Draft CR for 38.101-1: adding note for inter-band CA spurious emissions, Huawei</p> <p>R4-1901033, Alignment of Foob related description for 38.101-1, vivo</p> <p>R4-1901273, Correction of HARQ-ACK transmission timing for DL RMC for FR1 TDD SCS=60kHz, Ericsson</p> <p>R4-1901766, draft_CR TS 38.101-1 Correction to UL configuration for reference sensitivity, Skyworks Solutions Inc.</p> <p>R4-1901823, draft CR on spurious requirment for TS 38.101-1, Huawei, HiSilicon</p> <p>R4-1901835, draftCR on MSD for CA_n41-n78 for TS 38.101-1, Huawei</p> <p>R4-1901847, Draft CR for 38.101-1: Addition of default power class, Sprint Corporation</p> <p>R4-1901873, Receiver requirement RMC references, Qualcomm Incorporated</p> <p>R4-1901925, Draft CR to 38.101-1 to update and clarify Rx wide band intermod and spurious requirments for BW class C, D, E, Qualcomm Incorporated</p> <p>R4-1901992, Draft CR to 38.101-1. Correct FR1 NS_41 AMPR for n50, Huawei</p> <p>R4-1902001, Draft CR to 38.101-1 on n41 – B40 coexistence, Qualcomm Incorporated</p> | 15.5.0 |

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|         |        |           |      |   | <p>R4-1902150, Draft CR to TS38.101-1 Clarifications on MSD and UL configuration tables for inter-band CA, ZTE Corporation</p> <p>R4-1902166, Tx ON/OFF time mask for FR1, Qualcomm Inc</p> <p>R4-1902174, Draft CR to 38.101-1: On FR1 A-MPR NS_08 for n8, Qualcomm Incorporated</p> <p>R4-1902175, Draft CR on AMPR requirements for NS_05U and NS_08U to TS 38.101-1, Huawei</p> <p>R4-1902194, [41 DL]Draft CR for 38.101-1 adding DL intra-band CA requirements for frequency less than 2700MHz, Huawei</p> <p>R4-1902196, Draft CR for 7.9A Spurious emissions for CA, CMCC</p> <p>R4-1902223, UE optional bandwidth for FR1, Nokia</p> <p>R4-1902225, CR to 38.101-1 on CA BW Classes fallback groups, Intel Corporation</p> <p>R4-1902233, Draft CR to 38.101-1: SUL clarifications, Nokia</p> <p>R4-1902339, Draft CR to TS 38.101-1 on FR1 extension, Ericsson</p> <p>R4-1902455, Completion of the Pmax specification: additional P-max and P_Nr, Ericsson</p> <p>R4-1902468, Draft CR: Introduction of Annex on Characteristics of the Interfering Signal, Samsung</p> <p>R4-1902479, Draft CR on some errors to TS 38.101-1, Huawei</p> <p>R4-1902480, Draft CR for 38.101-1 modification of requirements for network signalled value NS_04, Huawei</p> <p>R4-1902655, CR to 38.101-1 on NR Uplink RBs location, Intel Corporation</p> <p>R4-1901610, Draft CR for 38.101-1 REFSSENS for UL MIMO, Huawei</p> <p>Editorial changes after RAN#83</p> <p>To align the annex numbering with other specifications (TS 38.101-x series), annexes J and K were added and Change history was numbered as annex L.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |
| 2019-06 | RAN#84 | RP-191240 | 0047 | F | <p>CR to TS 38.101-1: Implementation of endorsed draft CRs from RAN4#90bis and RAN4#91</p> <p>Endorced draft CRs from RAN4#90Bis</p> <p>R4-1902826, Draft CR for 38.101-1 modification of ACS test parameters case 2 for intra-band contiguous CA, Huawei</p> <p>R4-1902926, Draft CR to TS 38.101-1 Correction to Pmax, Intel Corporation</p> <p>R4-1902975, Draft CR on PRACH and PUCCH format description for EVM in FR1, Anritsu corporation</p> <p>R4-1903032, Draft CR on editorial error of TS38.101-1, LG Electronics France</p> <p>R4-1903120, Draft CR on DL power allocation for TS 38.101-1, Intel Corporation</p> <p>R4-1903124, Draft CR on b41-n40 coexistence, Intel Corporation</p> <p>R4-1903151, Draft CR to TS38.101-1 removing DC sections, ZTE Corporation</p> <p>R4-1903195, Draft CR for 38.101-1: remove the bracket of UE capability "powerBoosting-pi2BPSK", Huawei</p> <p>R4-1903392, Draft CR for TS 38.101-1: Corrections to EVM equalizer spectrum flatness requirements, MediaTek Inc.</p> <p>R4-1903473, Draft CR on FREF,Shift, CMCC</p> <p>R4-1903508, Draft CR to TS 38.101-1 on spurious emissions for UE co-existence, ZTE Corporation</p> <p>R4-1904335, DraftCR TS 38.101 Corrections to NS_100 UTRA ACLR frequency band list, Skyworks Solutions Inc.</p> <p>R4-1904460, Draft CR for 38.101-1 CA Pmax, Huawei</p> <p>R4-1904537, Draft CR for TR 38.101-1 correction of A-MPR for NS_04, Huawei</p> <p>R4-1904554, Draft CR to 38.101-1: FR1 power dynamics DTX removal, Qualcomm Incorporated</p> <p>R4-1904927, Draft CR to clarify frequency of carrier leakage in RBs for FR1, Anritsu corporation</p> <p>R4-1904928, Draft CR to TS 38.101-1 on description of UE additional output power reduction, ZTE Corporation</p> <p>R4-1904929, draft Rel-15 CR for editorial corrections in 38.101-1, Ericsson</p> <p>R4-1904941, draft CR to 38.101-1 Correction to Pi/2 BPSK power boosting, Intel Corporation</p> <p>R4-1904957, Draft CR for TR38.101-1 – Update to EVM averaging, Rohde &amp; Schwarz</p> <p>R4-1904958, Draft CR for TR38.101-1 – Update to spectrum flatness, Rohde &amp; Schwarz</p> <p>R4-1904967, Draft CR for 38.101-1 definition of Maximum input level for intra-band contiguous CA, Huawei</p> <p>R4-1904969, Draft CR for 38.101-1: editorial correction, Huawei</p> <p>R4-1904987, Draft CR for correction on TS38.101-1, CATT</p> | 15.6.0 |

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|         |        |           |      |   |   | <p>Endorsed draft CRs from RAN4#91</p> <p>R4-1905339 removal of A-MPR brackets in FR1 Nokia</p> <p>R4-1905503 Change description 4.2(d) in Applicability of minimum requirements for TS 38.101-1 vivo</p> <p>R4-1905524 [Rx]Draft CR for 38.101-1 Removing the brackets in Rx requirements Huawei</p> <p>R4-1905526 [Rx]Draft CR for 38.101-1 defining NBB requirements&lt;2.7GHz Huawei</p> <p>R4-1905772 Draft CR to TS38.101-1 Almost contiguous MPR Intel Corporation</p> <p>R4-1905795 Correction to a description of PRB for in-band emission in FR1 Anritsu Corporation</p> <p>R4-1905797 Correction to power control in FR1 Anritsu Corporation</p> <p>R4-1906140 draft CR for TS 38.101-1 Rx requirement for CA Huawei</p> <p>R4-1906153 Draft CR for TS 38.101-1: Editorial corrections to intra-band contiguous CA ACS and in-band blocking requirements MediaTek Inc.</p> <p>R4-1906154 Draft CR for TS 38.101-1: Adding symbol definitions for intra-band contiguous CA Rx maximum input level and ACS requirements MediaTek Inc.</p> <p>R4-1906871 Draft CR for TS 38.101-1 UE optional bandwidth for FR1 Huawei</p> <p>R4-1907131 Draft CR to 38.101-1. Clarification to FR1 NS_43 AMPR frequency ranges Qualcomm Incorporated</p> <p>R4-1907135 Draft CR to 38.101-1 rel. 15 to fix missing Exceptions for Out-of-band Blocking Apple</p> <p>R4-1907419 Draft CR for TS 38.101-1: Editorial improvement to EVM equalizer spectrum flatness requirements for Pi/2 BPSK MediaTek Inc.</p> <p>R4-1907429 Draft CR to TS38.101-1 A-MPR for Inter-band CA Intel Corporation</p> <p>R4-1907434 [Rx]Draft CR for 38.101-1 modifying characteristics of the interfering signal in Annex D Huawei</p> <p>R4-1907435 Draft CR to TS38.101-1 introduction of n41C and corrections on Rx requirements for NR intra-band contiguous CA ZTE Corporation</p> <p>R4-1907439 Draft CR to TS 38.101-1 on CA bandwidth class description ZTE Corporation</p> <p>R4-1907471 Draft CR to 38.101-1. Clarify all RB reference so transmission BW applies for all SCS Qualcomm Incorporated</p> <p>R4-1907474 Draft CR for TS 38.101-1 Correction of channel bandwidth set for NR CA Huawei</p> <p>R4-1907477 Draft CR to TS 38.101-1 on maximum aggregated bandwidth for NR CA configurations ZTE Corporation</p> <p>R4-1907481 Correction of RefSens exceptions due to UL harmonic interference for NR CA in 38.101-1 vivo</p> <p>R4-1907687 Correction to CA carrier spacing Ericsson</p> |        |
| 2019-06 | RAN#84 | RP-191248 | 0037 | 1 | B | Introduction of n48 in to TS 38.101-1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 16.0.0 |
| 2019-06 | RAN#84 | RP-191241 | 0040 |   | B | CR to REL-16 TS 38.101-1: Implementation of endorsed draft CRs on NR combinations and dual Connectivity combinations                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 16.0.0 |
| 2019-06 | RAN#84 | RP-191242 | 0041 | 1 | B | CR to TS 38.101-1: Introduction of band n14 – Endorsed R4-1904008 in RAN4#90b                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 16.0.0 |
| 2019-06 | RAN#84 | RP-191246 | 0042 | 1 | B | CR to TS 38.101-1: Introduction of band n30 + editorial in table 7.6.2-2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 16.0.0 |
| 2019-06 | RAN#84 | RP-191244 | 0043 | 1 | B | CR to introduce n18 to TS 38.101-1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 16.0.0 |
| 2019-06 | RAN#84 | RP-191250 | 0044 | 1 | B | n65 introduction to 38.101-1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 16.0.0 |
| 2019-06 | RAN#84 | RP-191251 | 0045 |   | B | Addition channel bandwidth of 30MHz for n50 in TS 38.101-1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 16.0.0 |
| 2019-06 | RAN#84 | RP-191252 | 0046 | 1 | B | Introduction of a new NR band for LTE/NR spectrum sharing in Band 41/n41                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 16.0.0 |
| 2019-06 | RAN#84 | RP-191241 | 0048 |   | B | CR on introducing NR inter-band CA of 3DL Bands and 1UL band                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 16.0.0 |
| 2019-06 | RAN#84 | RP-191241 | 0049 |   | B | CR to reflect the completed NR inter-band CA/DC combinations into Rel16 TS38.101-1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 16.0.0 |
| 2019-06 | RAN#84 | RP-191241 | 0050 |   | B | CR to reflect the completed NR inter-band CA/DC combinations for 3 bands DL with 2 bands UL into Rel16 TS38.101-1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 16.0.0 |
| 2019-06 | RAN#84 | RP-191241 | 0051 |   | B | CR introduction completed band combinations 38.716-01-01 -> 38.101-1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 16.0.0 |
| 2019-09 | RAN#85 | RP-192038 | 0052 |   | F | Correction to FR1 ASEM NS_27                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 16.1.0 |
| 2019-09 | RAN#85 | RP-192032 | 0053 |   | B | Addition of NS information on 30MHz support for n41                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 16.1.0 |
| 2019-09 | RAN#85 | RP-192031 | 0054 | 1 | B | Addition of new channel bandwidths for n7 into TS 38.101-1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 16.1.0 |
| 2019-09 | RAN#85 | RP-192027 | 0055 |   | B | CR on introducing NR intra-band CA for 3DL Bands and 1UL band                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 16.1.0 |
| 2019-09 | RAN#85 | RP-192027 | 0057 | 1 | F | Minor corrections of intra-band non-contiguous CA operating bands in TS 38.101-1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 16.1.0 |
| 2019-09 | RAN#85 | RP-192027 | 0058 | 1 | F | Adding DeltaFHD for CA_n1-n77 refersense requirments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 16.1.0 |



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| 2019-09 | RAN#85 | RP-192032 | 0060 |   | B | CR to introduce 30MHz bandwidth of n41 into TS 38.101-1                                                                                              | 16.1.0 |
| 2019-09 | RAN#85 | RP-192026 | 0061 | 1 | B | Characteristics of Interfering signal for Contiguous Intra-band CA Class B                                                                           | 16.1.0 |
| 2019-09 | RAN#85 | RP-192027 | 0062 | 1 | F | Correction Inter-band CA configurations                                                                                                              | 16.1.0 |
| 2019-09 | RAN#85 | RP-192027 | 0063 | 1 | F | Finalizing Generic Intra-band Contiguous CA Class B requirements                                                                                     | 16.1.0 |
| 2019-09 | RAN#85 | RP-192034 | 0064 | 1 | B | n29 introduction to 38.101                                                                                                                           | 16.1.0 |
| 2019-09 | RAN#85 | RP-192027 | 0065 |   | F | [SUL] CR on SUL band combinations into Rel-16 TS 38.101-1                                                                                            | 16.1.0 |
| 2019-09 | RAN#85 | RP-192029 | 0066 |   | B | CR on Introduction of SUL band n89 into Rel-16 TS 38.101-1                                                                                           | 16.1.0 |
| 2019-09 | RAN#85 | RP-192046 | 0068 | 2 | F | Correction to Band n66                                                                                                                               | 16.1.0 |
| 2019-09 | RAN#85 | RP-192026 | 0070 | 1 | F | CR to 38.101-1. Revamp CA ACS and IBB tables to differentiate by band numbers and not frequency                                                      | 16.1.0 |
| 2019-09 | RAN#85 | RP-192038 | 0071 |   | F | CR to 38.101-1. Add missing AMPR to NS27                                                                                                             | 16.1.0 |
| 2019-09 | RAN#85 | RP-192026 | 0072 |   | B | CR for 38.101-1 Rx requirement for NR intra-band non-contiguous CA                                                                                   | 16.1.0 |
| 2019-09 | RAN#85 | RP-192036 | 0073 |   | F | CR for 38.101-1: Correction to the Spurious Emission for UE Coexistence table for n14                                                                | 16.1.0 |
| 2019-09 | RAN#85 | RP-192037 | 0074 |   | F | CR for 38.101-1: Correction to the Spurious Emission for UE Coexistence table for n30                                                                | 16.1.0 |
| 2019-09 | RAN#85 | RP-192027 | 0075 |   | B | CR introduction completed band combinations 38.716-01-01 -> 38.101-1                                                                                 | 16.1.0 |
| 2019-09 | RAN#85 | RP-192027 | 0076 |   | B | CR to reflect the completed NR inter band CA DC combinations for 2 bands DL with up to 2 bands UL into Rel16 TS 38.101-1                             | 16.1.0 |
| 2019-09 | RAN#85 | RP-192027 | 0077 |   | B | CR to reflect the completed NR inter band CA DC combinations for 3 bands DL with 2 bands UL into Rel16 TS 38.101-1                                   | 16.1.0 |
| 2019-09 | RAN#85 | RP-192049 | 0079 |   | A | CR to TS 38.101-1: Implementation of endorsed draft CRs from RAN4#92 (Rel-16)<br>- Mirrors changes in R4-1910350 (of RAN4#92) for Rel-15 TS 38.101-1 | 16.1.0 |
| 2019-12 | RAN#86 | RP-193022 | 0097 |   | F | CR to align NS27 AMPR to CA_NS_10 AMPR for 40MHz BW at the center of band 48.                                                                        | 16.2.0 |
| 2019-12 | RAN#86 | RP-193028 | 0099 |   | A | CR for 38.101- RX Out-of-Band Blocking for B38 and B41                                                                                               | 16.2.0 |
| 2019-12 | RAN#86 | RP-193028 | 0103 |   | A | CR for 38.101-1 n39 AMPR                                                                                                                             | 16.2.0 |
| 2019-12 | RAN#86 | RP-193013 | 0105 | 1 | B | Introduction of 2010-2025MHz SUL band into Rel-16 TS 38.101-1                                                                                        | 16.2.0 |
| 2019-12 | RAN#86 | RP-193015 | 0110 |   | B | Addition of 25, 30 and 40 MHz to NR band n25 in TS 38.101-1                                                                                          | 16.2.0 |
| 2019-12 | RAN#86 | RP-193028 | 0112 |   | A | Sync raster to SSB resource element mapping                                                                                                          | 16.2.0 |
| 2019-12 | RAN#86 | RP-193028 | 0114 |   | A | CR to TS 38.101-1 Almost contiguous A-MPR (R16)                                                                                                      | 16.2.0 |
| 2019-12 | RAN#86 | RP-193028 | 0118 |   | A | CR to 38.101-1 (Rel-16) to clarify measurement interval and observation window on frequency error                                                    | 16.2.0 |
| 2019-12 | RAN#86 | RP-193020 | 0119 |   | D | Format misalignment on NS_47 protection requirement table                                                                                            | 16.2.0 |
| 2019-12 | RAN#86 | RP-193028 | 0121 |   | A | CR to TS 38.101-1: Replace CBW with symbols defined in the specification                                                                             | 16.2.0 |
| 2019-12 | RAN#86 | RP-193012 | 0124 |   | B | CR to reflect the completed NR inter band CA DC combinations for 2 bands DL with up to 2 bands UL into Rel16 TS 38.101-1                             | 16.2.0 |
| 2019-12 | RAN#86 | RP-193012 | 0125 |   | B | CR to reflect the completed NR inter band CA DC combinations for 3 bands DL with 2 bands UL into Rel16 TS 38.101-1                                   | 16.2.0 |
| 2019-12 | RAN#86 | RP-193012 | 0126 |   | F | CR to remove square brackets for n90 in TS38.101-1                                                                                                   | 16.2.0 |
| 2019-12 | RAN#86 | RP-193028 | 0128 |   | A | CR for TS38.101-1, Clarification and Editorial corrections                                                                                           | 16.2.0 |
| 2019-12 | RAN#86 | RP-193012 | 0132 |   | B | Introducing NR inter-band CA for 3DL Bands and 1UL band for 38.101-1                                                                                 | 16.2.0 |
| 2019-12 | RAN#86 | RP-193029 | 0133 |   | B | Adding band n71 and n28 to 4 Rx antenna ports support in 38.101-1                                                                                    | 16.2.0 |
| 2019-12 | RAN#86 | RP-193028 | 0137 |   | A | CR for TS 38.101-1: Editorial correction for n2 uplink configuration note index in Table 7.3.2-3                                                     | 16.2.0 |
| 2019-12 | RAN#86 | RP-193028 | 0138 |   | A | CR to TS 38.101-1 on A-MPR table cleanup (Rel-16)                                                                                                    | 16.2.0 |
| 2019-12 | RAN#86 | RP-193029 | 0140 |   | A | CR for TS 38.101-1: Removing CA configurations for CA_n77D/E, CA_n78D/E, and CA_n79D/E                                                               | 16.2.0 |
| 2019-12 | RAN#86 | RP-193029 | 0144 |   | A | CR for TS 38.101-1: Fix out-of-band blocking issue for n50 and n75                                                                                   | 16.2.0 |
| 2019-12 | RAN#86 | RP-193029 | 0146 |   | A | CR to TS 38.101-1 on corrections to channel raster entries for NR band (Rel-16)                                                                      | 16.2.0 |
| 2019-12 | RAN#86 | RP-193029 | 0150 |   | A | CR to transmit modulation quality in FR1                                                                                                             | 16.2.0 |
| 2019-12 | RAN#86 | RP-193012 | 0151 |   | F | Corrections Intra-band CA simultaneous TX/RX requirements                                                                                            | 16.2.0 |
| 2019-12 | RAN#86 | RP-193029 | 0153 |   | F | Removal of brackets from receiver requirements in 38.101-1 REL-16                                                                                    | 16.2.0 |
| 2019-12 | RAN#86 | RP-193012 | 0155 |   | B | Extension of CA BW class B                                                                                                                           | 16.2.0 |
| 2019-12 | RAN#86 | RP-193029 | 0157 |   | A | CR to 38.101-1: Editorial correction of UL RMCs                                                                                                      | 16.2.0 |
| 2019-12 | RAN#86 | RP-193012 | 0164 |   | B | CR for 38.101-1 introduce SUL band combination CA_n78(2A)_SUL_n78A-n86A                                                                              | 16.2.0 |
| 2019-12 | RAN#86 | RP-193010 | 0165 |   | F | CR for 38.101-1: add BCS1 configurations for CA_n78(2A)                                                                                              | 16.2.0 |
| 2019-12 | RAN#86 | RP-193017 | 0166 |   | B | CR to 38.101-1 - Band n75 - wider CBW                                                                                                                | 16.2.0 |
| 2019-12 | RAN#86 | RP-193018 | 0167 |   | B | CR for TS 38.101: adding wider channel bandwidths                                                                                                    | 16.2.0 |
| 2019-12 | RAN#86 | RP-193016 | 0168 |   | B | CR to 38.101-1: Addition of channel bandwidth for band n38                                                                                           | 16.2.0 |
| 2019-12 | RAN#86 | RP-193012 | 0169 |   | B | CR introduction completed band combinations 38.716-01-01 -> 38.101-1                                                                                 | 16.2.0 |
| 2019-12 | RAN#86 | RP-193012 | 0170 |   | B | CR introduction completed band combinations 38.716-04-01 -> 38.101-1                                                                                 | 16.2.0 |

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| 2019-12 | RAN#86 | RP-193021 | 0171 |   | C | CR for 38.101-1: Making 90 MHz channel bandwidth mandatory for n41, n78 and n90                                                                                                                                                                                                                                            | 16.2.0 |
| 2019-12 | RAN#86 | RP-193020 | 0172 |   | B | CR for 38.101-1: adding 30 MHz CHBW to NS_04 for n41                                                                                                                                                                                                                                                                       | 16.2.0 |
| 2019-12 | RAN#86 | RP-193029 | 0174 |   | A | CR to 38.101-1-g10 Corrections to Transient Time Masks                                                                                                                                                                                                                                                                     | 16.2.0 |
| 2019-12 | RAN#86 | RP-193010 | 0176 | 1 | F | CR for intra-band DL contiguous CA RF requirements                                                                                                                                                                                                                                                                         | 16.2.0 |
| 2019-12 | RAN#86 | RP-193010 | 0179 |   | B | Introduction of almost contiguous MPR for PC2                                                                                                                                                                                                                                                                              | 16.2.0 |
| 2019-12 | RAN#86 | RP-193029 | 0180 |   | A | CR for asynchronous operation for NR CA n78-n79                                                                                                                                                                                                                                                                            | 16.2.0 |
| 2019-12 | RAN#86 | RP-193028 | 0182 |   | A | CR to 38.101-1: DMRS Exceptions                                                                                                                                                                                                                                                                                            | 16.2.0 |
| 2020-03 | RAN#87 | RP-200408 | 0191 |   | F | Corrections to n65                                                                                                                                                                                                                                                                                                         | 16.3.0 |
| 2020-03 | RAN#87 | RP-200377 | 0201 | 1 | F | CR for 38.101-1 to introduce BCS1 for CA_n77C and CA_n78C                                                                                                                                                                                                                                                                  | 16.3.0 |
| 2020-03 | RAN#87 | RP-200394 | 0203 |   | A | CR to TS 38.101-1 on corrections to network signalling value (Rel-16)                                                                                                                                                                                                                                                      | 16.3.0 |
| 2020-03 | RAN#87 | RP-200484 | 0208 |   | A | CR for 38.101- n39 NS flag change due to conflict                                                                                                                                                                                                                                                                          | 16.3.0 |
| 2020-03 | RAN#87 | RP-200394 | 0210 |   | A | Mirror CR for 38.101-1: n41 and n25 corrections                                                                                                                                                                                                                                                                            | 16.3.0 |
| 2020-03 | RAN#87 | RP-200380 | 0211 | 2 | F | CR for 38.101-1: Corrections to intra-band CA tables                                                                                                                                                                                                                                                                       | 16.3.0 |
| 2020-03 | RAN#87 | RP-200387 | 0212 |   | F | CR for 38.101-1: Missing 70 MHz for NS_01                                                                                                                                                                                                                                                                                  | 16.3.0 |
| 2020-03 | RAN#87 | RP-200381 | 0215 |   | B | CR for 38.101-1: Introduction of n26                                                                                                                                                                                                                                                                                       | 16.3.0 |
| 2020-03 | RAN#87 | RP-200380 | 0216 |   | F | CR to TS 38.101-1: Corrections on MSD tables for CA_n20-n78 and CA_n66-n78                                                                                                                                                                                                                                                 | 16.3.0 |
| 2020-03 | RAN#87 | RP-200394 | 0218 |   | A | CR to TS 38.101-1: corrections on ACS for intra-band contiguous CA                                                                                                                                                                                                                                                         | 16.3.0 |
| 2020-03 | RAN#87 | RP-200380 | 0219 | 1 | F | CR to TS 38.101-1: Improvement on NR 3DL inter-band CA combination                                                                                                                                                                                                                                                         | 16.3.0 |
| 2020-03 | RAN#87 | RP-200394 | 0221 |   | A | CR to TS 38.101-1: Replace CBW with symbols defined in the specification.<br><br>NOTE: The CR is based on something else than the latest version of the specification and therefore it is not implemented, e.g. Tables 6.2.3.1-1, 7.6.2-2 and Table 7.6.2-4 in CR0221 are different compared to those in 38.101-1 v16.2.0. | 16.3.0 |
| 2020-03 | RAN#87 | RP-200380 | 0222 |   | B | CR to reflect the completed NR inter band CA DC combinations for 2 bands DL with up to 2 bands UL into Rel16 TS 38.101-1                                                                                                                                                                                                   | 16.3.0 |
| 2020-03 | RAN#87 | RP-200380 | 0223 |   | B | CR to reflect the completed NR inter band CA DC combinations for 3 bands DL with 2 bands UL into Rel16 TS 38.101-1                                                                                                                                                                                                         | 16.3.0 |
| 2020-03 | RAN#87 | RP-200394 | 0224 | 1 | B | Introduction of n53 into TS 38.101-1                                                                                                                                                                                                                                                                                       | 16.3.0 |
| 2020-03 | RAN#87 | RP-200394 | 0229 |   | A | CR for TS38.101-1, Remove notes for UE channel bandwidth                                                                                                                                                                                                                                                                   | 16.3.0 |
| 2020-03 | RAN#87 | RP-200394 | 0231 |   | A | CR for TS38.101-1, Correction of IE RF-Parameters name of maxUplinkDutyCycle                                                                                                                                                                                                                                               | 16.3.0 |
| 2020-03 | RAN#87 | RP-200380 | 0234 | 1 | B | Introducing NR inter-band CA for 3DL Bands and 1UL band for 38.101-1                                                                                                                                                                                                                                                       | 16.3.0 |
| 2020-03 | RAN#87 | RP-200377 | 0239 | 1 | F | CR for TS 38.101-1: Corrections for n48 receiver requirements                                                                                                                                                                                                                                                              | 16.3.0 |
| 2020-03 | RAN#87 | RP-200386 | 0240 | 1 | B | CR for TS 38.101: adding wider channel bandwidths for n66                                                                                                                                                                                                                                                                  | 16.3.0 |
| 2020-03 | RAN#87 | RP-200392 | 0241 | 1 | F | Maintenance on the UE BW for n92 and n94                                                                                                                                                                                                                                                                                   | 16.3.0 |
| 2020-03 | RAN#87 | RP-200392 | 0242 |   | F | Maintenance on the Rx-Tx separation terms                                                                                                                                                                                                                                                                                  | 16.3.0 |
| 2020-03 | RAN#87 | RP-200394 | 0244 |   | A | CR for 38.101-1: to remove fallback group 1 in table 5.5A.1-1                                                                                                                                                                                                                                                              | 16.3.0 |
| 2020-03 | RAN#87 | RP-200389 | 0247 |   | F | CR for 38.101-1: to correct CA_n8A-n75A REFSSENS                                                                                                                                                                                                                                                                           | 16.3.0 |
| 2020-03 | RAN#87 | RP-200384 | 0249 | 1 | B | CR for 38.101-1: to introduce UE RF requirements for adding wider channel bandwidth in band n28                                                                                                                                                                                                                            | 16.3.0 |
| 2020-03 | RAN#87 | RP-200383 | 0250 | 1 | B | CR to 38.101-1 Band n1 - wider CBW - Additional Channel BW                                                                                                                                                                                                                                                                 | 16.3.0 |
| 2020-03 | RAN#87 | RP-200385 | 0252 | 1 | B | CR to 38.101-1 Band n38 - wider CBW - Additional Channel BW                                                                                                                                                                                                                                                                | 16.3.0 |
| 2020-03 | RAN#87 | RP-200380 | 0260 | 1 | F | Editorial corrections                                                                                                                                                                                                                                                                                                      | 16.3.0 |
| 2020-03 | RAN#87 | RP-200377 | 0263 |   | F | CR for almost contiguous allocation applicability                                                                                                                                                                                                                                                                          | 16.3.0 |
| 2020-03 | RAN#87 | RP-200394 | 0265 | 1 | A | CR for inter-band CA Tx requirement                                                                                                                                                                                                                                                                                        | 16.3.0 |
| 2020-03 | RAN#87 | RP-200377 | 0266 | 1 | F | CR for intra-band CA configuration and DL RF requirements                                                                                                                                                                                                                                                                  | 16.3.0 |
| 2020-03 | RAN#87 | RP-200391 | 0273 |   | F | CR for 38.101-1: Mandatory support for n41 by UEs that support n90                                                                                                                                                                                                                                                         | 16.3.0 |
| 2020-03 | RAN#87 | RP-200394 | 0275 |   | A | CR for [agreed] asynchronous operation for NR CA n78-n79<br><br>NOTE: The CR is based on something else than the latest version of the specification and therefore it is not implemented, e.g. Tables 6.2A.4.2.3-1, Table 7.3A.6-1, 7.3A.6.2 and table notes are different compared to those in 38.101-1 v16.2.0.          | 16.3.0 |
| 2020-03 | RAN#87 | RP-200380 | 0280 |   | F | CR for 38.101-1: delta Tib corrections                                                                                                                                                                                                                                                                                     | 16.3.0 |
| 2020-03 | RAN#87 | RP-200394 | 0281 |   | A | Removal of unnecessary definition of offset <sub>max,IMD3</sub> from Table 6.2.3.2-1                                                                                                                                                                                                                                       | 16.3.0 |
| 2020-06 | RAN#88 | RP-201338 | 0293 | 4 | B | CR to TS 38.101-1: Switching time mask between two uplink carriers in UL CA and SUL                                                                                                                                                                                                                                        | 16.4.0 |
| 2020-06 | RAN#88 | RP-200959 | 0294 |   | F | Corrections to CA n48                                                                                                                                                                                                                                                                                                      | 16.4.0 |
| 2020-06 | RAN#88 | RP-200985 | 0300 |   | A | CR to asymmetric CBW operation in FR1                                                                                                                                                                                                                                                                                      | 16.4.0 |
| 2020-06 | RAN#88 | RP-200985 | 0302 |   | A | CR on ACLR MBW definition in FR1                                                                                                                                                                                                                                                                                           | 16.4.0 |

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| 2020-06 | RAN#88 | RP-200959 | 0305 |   | B | Introducing NR inter-band CA for 3DL Bands and 1UL band for 38.101-1                                                     | 16.4.0 |
| 2020-06 | RAN#88 | RP-200959 | 0307 |   | F | CR Coexistence cleanup for 38101-1 Rel16                                                                                 | 16.4.0 |
| 2020-06 | RAN#88 | RP-200985 | 0310 |   | A | CR to TS 38.101-1 R16: corrections on ACS for intra-band contiguous CA                                                   | 16.4.0 |
| 2020-06 | RAN#88 | RP-200966 | 0311 |   | F | CR for TS 38.101-1: UL harmonic MSD and OOB exception                                                                    | 16.4.0 |
| 2020-06 | RAN#88 | RP-200981 | 0315 |   | F | Update 4Rx Requirement for Band n30                                                                                      | 16.4.0 |
| 2020-06 | RAN#88 | RP-200958 | 0317 |   | B | CR on NR V2X UE RF requirements for single carrier in TS38.101-1                                                         | 16.4.0 |
| 2020-06 | RAN#88 | RP-200985 | 0327 |   | A | Maintenance CR to 38101-1 on relative power tolerance R16                                                                | 16.4.0 |
| 2020-06 | RAN#88 | RP-200974 | 0329 |   | F | Endorsed CR on default AMPR signaling for n91 n92 n93 and n94                                                            | 16.4.0 |
| 2020-06 | RAN#88 | RP-200985 | 0331 |   | A | Update of CSI-RS definition for FR1 DL RMCs                                                                              | 16.4.0 |
| 2020-06 | RAN#88 | RP-200985 | 0335 |   | A | Correction to FR1 QPSK UL RMC                                                                                            | 16.4.0 |
| 2020-06 | RAN#88 | RP-200966 | 0336 |   | B | CR to TS38.101-1: Introduction of NR DC(Clauses 3                                                                        | 16.4.0 |
| 2020-06 | RAN#88 | RP-200985 | 0338 |   | A | CR to TS 38.101-1: Correction on the CA nominal channel spacing                                                          | 16.4.0 |
| 2020-06 | RAN#88 | RP-200985 | 0340 |   | A | CR to TS 38.101-1: Replace CBW with symbols defined in the specification.                                                | 16.4.0 |
| 2020-06 | RAN#88 | RP-200959 | 0341 |   | B | CR to reflect the completed NR inter band CA DC combinations for 2 bands DL with up to 2 bands UL into Rel16 TS 38.101-1 | 16.4.0 |
| 2020-06 | RAN#88 | RP-200985 | 0345 |   | A | 30k SSB SCS for n50                                                                                                      | 16.4.0 |
| 2020-06 | RAN#88 | RP-200985 | 0347 |   | A | Addition of 30k SSB SCS for Band n38                                                                                     | 16.4.0 |
| 2020-06 | RAN#88 | RP-200985 | 0354 |   | A | IBE measurements for Pi/2 BPSK with spectrum shaping                                                                     | 16.4.0 |
| 2020-06 | RAN#88 | RP-200959 | 0357 |   | B | CR to reflect the completed NR inter band CA DC combinations for 3 bands DL with 2 bands UL into Rel16 TS 38.101-1       | 16.4.0 |
| 2020-06 | RAN#88 | RP-200959 | 0360 |   | B | CR introduction completed band combinations 38.716-01-01 -                                                               | 16.4.0 |
| 2020-06 | RAN#88 | RP-200959 | 0361 |   | B | CR introduction completed band combinations 38.716-04-01 -                                                               | 16.4.0 |
| 2020-06 | RAN#88 | RP-200959 | 0364 |   | B | CR on Introduction of completed SUL band combinations into TS 38.101-1                                                   | 16.4.0 |
| 2020-06 | RAN#88 | RP-201045 | 0365 |   | F | CR for 38.101-1 to introduce BCS2 for CA_n78(2A).                                                                        | 16.4.0 |
| 2020-06 | RAN#88 | RP-200985 | 0367 |   | A | CR for 38.101-1 to remove the NR CA configuration for REFSENS exception due to cross band isolation for CA (mirror CR)   | 16.4.0 |
| 2020-06 | RAN#88 | RP-200985 | 0369 |   | A | CR for 38.101-1 to add the REFSENS exception for inter band CA with SDL (mirror CR)                                      | 16.4.0 |
| 2020-06 | RAN#88 | RP-200979 | 0373 |   | F | CR on introduce delta-MPR for inter-band CA in band n28 and review value with brackets                                   | 16.4.0 |
| 2020-06 | RAN#88 | RP-200985 | 0379 |   | A | IBE requirement for almost contiguous allocations                                                                        | 16.4.0 |
| 2020-06 | RAN#88 | RP-200985 | 0385 |   | A | OOB blocking for n70 adjacent to n25                                                                                     | 16.4.0 |
| 2020-06 | RAN#88 | RP-200985 | 0394 |   | F | CR for TS 38.101-1 UE co-existence correction (R16)                                                                      | 16.4.0 |
| 2020-06 | RAN#88 | RP-200985 | 0396 |   | F | CR for 38.101-1 RFC corrections (R16)                                                                                    | 16.4.0 |
| 2020-06 | RAN#88 | RP-200985 | 0400 |   | A | TS38.101-1 CR on 30KHz SSB SCS for n40(Rel-16)                                                                           | 16.4.0 |
| 2020-06 | RAN#88 | RP-200959 | 0318 | 1 | F | CR to add simultaneous RXTX capability for CA_n41-n79                                                                    | 16.4.0 |
| 2020-06 | RAN#88 | RP-200985 | 0404 |   | A | CR for 38.101-1: to add some missing sub-clause title for NR inter-band CA                                               | 16.4.0 |
| 2020-06 | RAN#88 | RP-200985 | 0343 | 1 | A | CR for [agreed] asynchronous operation for NR CA_n78-n79                                                                 | 16.4.0 |
| 2020-06 | RAN#88 | RP-201045 | 0387 | 1 | B | CR on FR1 UL contiguous CA requirement                                                                                   | 16.4.0 |
| 2020-06 | RAN#88 | RP-200974 | 0325 | 1 | F | CR on blocking requirements for n91 n92 n93 and n94                                                                      | 16.4.0 |
| 2020-06 | RAN#88 | RP-201045 | 0380 | 1 | B | Addition of mutual UE coexistence between US bands and NR Band n77                                                       | 16.4.0 |
| 2020-06 | RAN#88 | RP-200977 | 0356 | 1 | B | CR for TS 38.101: adding 50 MHz CBW for n1                                                                               | 16.4.0 |
| 2020-06 | RAN#88 | RP-200980 | 0358 | 1 | B | CR to TS 38.101-1 - Add 40 MHz CBW in band n3                                                                            | 16.4.0 |
| 2020-06 | RAN#88 | RP-200982 | 0359 | 1 | B | CR to TS 38.101-1 - Add 50 MHz CBW in band n65                                                                           | 16.4.0 |
| 2020-06 | RAN#88 | RP-200985 | 0405 |   | F | Corrections of UE co-ex tables for Japan-related bands (R16)                                                             | 16.4.0 |
| 2020-06 | RAN#88 | RP-201045 | 0320 | 2 | B | CR to 38.101-1: Introduce an operating band list and NR bands to UL MIMO                                                 | 16.4.0 |
| 2020-06 | RAN#88 | RP-200966 | 0362 | 1 | B | CR to 38.101-1 for Introduction of requirements for NR-DC                                                                | 16.4.0 |
| 2020-09 | RAN#89 | RP-201495 | 0407 | 1 | F | Correction to FR1 UL contiguous CA MPR regions                                                                           | 16.5.0 |
| 2020-09 | RAN#89 | RP-201506 | 0409 |   | F | CR for n26 AMPR for 256QAM                                                                                               | 16.5.0 |
| 2020-09 | RAN#89 | RP-201512 | 0411 |   | A | OOB blocking for Inter-band CA                                                                                           | 16.5.0 |
| 2020-09 | RAN#89 | RP-201512 | 0416 | 1 | F | Correction to ASEM for NS_27                                                                                             | 16.5.0 |
| 2020-09 | RAN#89 | RP-201507 | 0419 |   | F | Introduction of UE PC2 for NR band n40                                                                                   | 16.5.0 |
| 2020-09 | RAN#89 | RP-201502 | 0422 | 1 | B | Introduction of LTE/NR spectrum sharing in band 48/n48 frequency range                                                   | 16.5.0 |
| 2020-09 | RAN#89 | RP-201507 | 0423 |   | F | Coexistence cleanup for 38101-1 Rel16                                                                                    | 16.5.0 |
| 2020-09 | RAN#89 | RP-201506 | 0424 |   | D | CR Editorial cleanup of band combination tables for 38101-1 Rel16                                                        | 16.5.0 |
| 2020-09 | RAN#89 | RP-201512 | 0426 |   | A | CR to TS 38.101-1: corrections on narrow band blocking for intra-band contiguous CA                                      | 16.5.0 |
| 2020-09 | RAN#89 | RP-201492 | 0428 | 1 | F | CR for TS 38.101-1: Removal of table 6.5E.3.4.3-1 and table 6.5E.3.4.3-2                                                 | 16.5.0 |
| 2020-09 | RAN#89 | RP-201503 | 0432 | 1 | B | CR for 38.101-1: Introduction of Power Class 1.5                                                                         | 16.5.0 |
| 2020-09 | RAN#89 | RP-201488 | 0433 | 1 | B | CR to TS38.101-1 on introduction of Uplink Full Power Transmission                                                       | 16.5.0 |
| 2020-09 | RAN#89 | RP-201512 | 0435 |   | A | Corrections of Japan-related CA co-ex tables for REL-15 combo                                                            | 16.5.0 |
| 2020-09 | RAN#89 | RP-201492 | 0437 | 1 | F | Correction on 5G V2X UE RF requirements in rel-16                                                                        | 16.5.0 |
| 2020-09 | RAN#89 | RP-201495 | 0438 | 2 | B | A-MPR definition for CA_n48B, CA_n41B and CA_n41C                                                                        | 16.5.0 |

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| 2020-09 | RAN#89 | RP-201495 | 0439 |   | F | CR Restoring the clause structure of NR FR1 uplink contiguous intraband CA                                              | 16.5.0 |
| 2020-09 | RAN#89 | RP-201492 | 0440 | 1 | F | CR on TS38.101-1 for NR V2X                                                                                             | 16.5.0 |
| 2020-09 | RAN#89 | RP-201512 | 0442 |   | A | 30k SSB SCS for Band n34 and n39                                                                                        | 16.5.0 |
| 2020-09 | RAN#89 | RP-201512 | 0444 |   | F | Correction for 5 MHz channel bandwidth for n50 and introduction of Annex H                                              | 16.5.0 |
| 2020-09 | RAN#89 | RP-201512 | 0458 |   | A | CR for 38.101-1 FRC corrections (R16)                                                                                   | 16.5.0 |
| 2020-09 | RAN#89 | RP-201506 | 0459 | 1 | F | CR for 38.101-1 to remove PHS system and 860~890 protection for NR CA band combination with band n1 and band n8         | 16.5.0 |
| 2020-09 | RAN#89 | RP-201506 | 0460 | 1 | F | CR for 38.101-1 to add the missing region for NS_18 and maintenance the ?mprc                                           | 16.5.0 |
| 2020-09 | RAN#89 | RP-201512 | 0462 |   | A | CR for 38.101-1 to add the missing MSD for CA_n41A-n78A                                                                 | 16.5.0 |
| 2020-09 | RAN#89 | RP-201512 | 0465 |   | A | Correction to configured power with allowance for SRS switching                                                         | 16.5.0 |
| 2020-09 | RAN#89 | RP-202117 | 0466 |   | B | Introduce UE NR-U requirements to 38.101-1 including Band n46 (5 GHz) and Band n96 (6 GHz)                              | 16.5.0 |
| 2020-09 | RAN#89 | RP-201495 | 0468 | 1 | F | CR for intra-band UL CA non-contiguous CA requirement                                                                   | 16.5.0 |
| 2020-09 | RAN#89 | RP-201495 | 0469 | 1 | F | CR for correction on intra-band UL CA contiguous CA requirement                                                         | 16.5.0 |
| 2020-09 | RAN#89 | RP-201495 | 0470 | 1 | F | CR for intra-band UL contiguous CA DC location                                                                          | 16.5.0 |
| 2020-09 | RAN#89 | RP-201495 | 0471 | 1 | B | CR for intra-band UL CA non-contiguous CA requirement                                                                   | 16.5.0 |
| 2020-09 | RAN#89 | RP-201507 | 0480 | 1 | F | CR to 38.101-1 - Correction to CA BCS and cross band isolation MSD tables                                               | 16.5.0 |
| 2020-09 | RAN#89 | RP-201512 | 0483 |   | A | Correction of applicability of 2Rx requirements                                                                         | 16.5.0 |
| 2020-09 | RAN#89 | RP-201488 | 0486 | 2 | B | CR to add PC3 Pi/2 BPSK DMRS for IE powerBoostPi2BPSK = 0                                                               | 16.5.0 |
| 2020-09 | RAN#89 | RP-202098 | 0499 | 1 | C | 7.5 kHz UL shift for LTE/NR spectrum sharing in Band 38/n38                                                             | 16.5.0 |
| 2020-12 | RAN#90 | RP-202440 | 0492 | 1 | F | CR CatF n7 NS_46 AMPR and coexistence                                                                                   | 16.6.0 |
| 2020-12 | RAN#90 | RP-202427 | 0498 | 1 | F | Correction on 5G V2X UE RF requirements in TS38.101-1 in rel-16                                                         | 16.6.0 |
| 2020-12 | RAN#90 | RP-202438 | 0506 |   | F | n53 bracket removal                                                                                                     | 16.6.0 |
| 2020-12 | RAN#90 | RP-202442 | 0507 | 2 | F | A-MPR definition for CA_n7B, CA_n48B, CA_n41B and CA_n41C                                                               | 16.6.0 |
| 2020-12 | RAN#90 | RP-202485 | 0512 |   | A | CR to TS38.101-1 on DC location correction                                                                              | 16.6.0 |
| 2020-12 | RAN#90 | RP-202509 | 0518 |   | F | Coexistence cleanup for 38.101-1 Rel16                                                                                  | 16.6.0 |
| 2020-12 | RAN#90 | RP-202509 | 0524 | 1 | F | CR to TS 38.101-1 on simplification for inter-band CA configuration                                                     | 16.6.0 |
| 2020-12 | RAN#90 | RP-202427 | 0525 |   | F | CR on TS38.101-1 for NR V2X                                                                                             | 16.6.0 |
| 2020-12 | RAN#90 | RP-202485 | 0527 |   | A | CR to TS 38.101-1[R16]: Clarification of non-simultaneous Rx/Tx operation for CA_n77-n79 and CA_n78-n79 in TS 38.101-1. | 16.6.0 |
| 2020-12 | RAN#90 | RP-202442 | 0533 | 1 | F | CR to 38.101-1 Add requirement on the UL CA configurations with no DL interruption                                      | 16.6.0 |
| 2020-12 | RAN#90 | RP-202509 | 0534 |   | F | Editorial correction on section 5.2C to 38.101-1 R16                                                                    | 16.6.0 |
| 2020-12 | RAN#90 | RP-202427 | 0535 | 1 | F | CR on V2X bands reference table                                                                                         | 16.6.0 |
| 2020-12 | RAN#90 | RP-202509 | 0536 | 1 | F | CR on sum of power for multiple transmit connectors                                                                     | 16.6.0 |
| 2020-12 | RAN#90 | RP-202428 | 0540 |   | F | CR for 38.101-1 to correct the notation of SUL band combinations in order to be aligned with 38.101-3                   | 16.6.0 |
| 2020-12 | RAN#90 | RP-202485 | 0542 |   | A | CR for 38.101-1 to adjust the structure of NR CA REFSSENS (Rel-16)                                                      | 16.6.0 |
| 2020-12 | RAN#90 | RP-202509 | 0544 |   | F | Reference measurement channels for 70 MHz CBW                                                                           | 16.6.0 |
| 2020-12 | RAN#90 | RP-202428 | 0547 |   | F | Correction to supported channel bandwidths per SUL_n41A-n81A                                                            | 16.6.0 |
| 2020-12 | RAN#90 | RP-202414 | 0550 | 3 | F | Correction to the intra-cell guard band definition for wideband operation                                               | 16.6.0 |
| 2020-12 | RAN#90 | RP-202414 | 0552 | 1 | F | Correction to receiver requirements for shared spectrum channel access                                                  | 16.6.0 |
| 2020-12 | RAN#90 | RP-202442 | 0556 |   | F | CR Correction to NS_27 and Band 10 protection 38101-1 Rel16                                                             | 16.6.0 |
| 2020-12 | RAN#90 | RP-202428 | 0557 | 1 | F | CR for editorial corrections 38.101-1                                                                                   | 16.6.0 |
| 2020-12 | RAN#90 | RP-202414 | 0558 | 2 | F | Removal of square brackets for 38.101-1 NR-U                                                                            | 16.6.0 |
| 2020-12 | RAN#90 | RP-202509 | 0562 |   | F | CR to for 38.101-1: CA uplink power clarification                                                                       | 16.6.0 |
| 2020-12 | RAN#90 | RP-202509 | 0563 |   | D | CR for 38.101-1: Editorial corrections                                                                                  | 16.6.0 |
| 2020-12 | RAN#90 | RP-202427 | 0566 | 1 | F | CR for 38.101-1 NR V2X FRC                                                                                              | 16.6.0 |
| 2020-12 | RAN#90 | RP-202485 | 0571 |   | A | CR for TS 38.101-1: correction of delta Tib for UE supporting multiple band combinations (R16)                          | 16.6.0 |
| 2020-12 | RAN#90 | RP-202442 | 0574 | 1 | B | CR for intra-band UL CA non-contiguous CA requirement                                                                   | 16.6.0 |
| 2020-12 | RAN#90 | RP-202485 | 0581 |   | A | CR for 38.101-1 on corrections for AMPR-Rel-16                                                                          | 16.6.0 |
| 2020-12 | RAN#90 | RP-202485 | 0584 |   | A | CR to DMRS position in UL RMC for FR1                                                                                   | 16.6.0 |
| 2020-12 | RAN#90 | RP-202456 | 0408 | 3 | B | LTE/NR spectrum sharing in Band 40/n40                                                                                  | 17.0.0 |
| 2020-12 | RAN#90 | RP-202451 | 0499 |   | B | Introduction of 1880-1920MHz SUL band into Rel-17 TS 38.101-1                                                           | 17.0.0 |
| 2020-12 | RAN#90 | RP-202452 | 0500 |   | B | introduction of 2300-2400MHz SUL band into Rel-17 TS 38.101-1                                                           | 17.0.0 |
| 2020-12 | RAN#90 | RP-202450 | 0503 | 1 | B | CR for TS 38.101-1, Introduce new band combination of V2X_n39A-n47A and V2X_n40A-n47A                                   | 17.0.0 |
| 2020-12 | RAN#90 | RP-202468 | 0504 |   | B | CR on Introducing NR inter-band CA for 3DL Bands and 1UL band for 38.101-1                                              | 17.0.0 |
| 2020-12 | RAN#90 | RP-202471 | 0513 |   | B | CR on introduction of completed NR CA/DC combs with 4DL/2UL within FR1                                                  | 17.0.0 |
| 2020-12 | RAN#90 | RP-202472 | 0514 |   | B | CR on Introduction of completed SUL band combinations into TS 38.101-1                                                  | 17.0.0 |
| 2020-12 | RAN#90 | RP-202448 | 0543 | 1 | B | CR to TS 38.101-1: introduction of NR band n13                                                                          | 17.0.0 |
| 2020-12 | RAN#90 | RP-202455 | 0545 |   | B | CR to 38.101-1 Introduce band combination requirements for PC2 CA_n1A-n78A                                              | 17.0.0 |

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| 2020-12 | RAN#90 | RP-202453 | 0546 | 1 | B | Big CR to 38.101-1 - Additional Channel BW                                                                               | 17.0.0 |
| 2020-12 | RAN#90 | RP-202466 | 0548 |   | B | CR introduction completed band combinations Rel-17 NR Intra-band -                                                       | 17.0.0 |
| 2020-12 | RAN#90 | RP-202470 | 0549 |   | B | CR introduction completed band combinations NR Inter-band 4 bands CA -                                                   | 17.0.0 |
| 2020-12 | RAN#90 | RP-202467 | 0585 |   | B | CR to reflect the completed NR inter band CA DC combinations for 2 bands DL with up to 2 bands UL into TS 38.101-1       | 17.0.0 |
| 2020-12 | RAN#90 | RP-202469 | 0586 |   | B | CR to reflect the completed NR inter band CA DC combinations for 3 bands DL with 2 bands UL into TS 38.101-1             | 17.0.0 |
| 2021-03 | RAN#91 | RP-210190 | 0589 |   | A | PC1 and PC3 Updates for Band n14                                                                                         | 17.1.0 |
| 2021-03 | RAN#91 | RP-210117 | 0594 | 1 | A | 38.101 Void clean up R17                                                                                                 | 17.1.0 |
| 2021-03 | RAN#91 | RP-210097 | 0604 | 2 | B | CR for TS 38.101-1 introduction of NR band n24                                                                           | 17.1.0 |
| 2021-03 | RAN#91 | RP-210072 | 0606 |   | A | CR on editorial correction on V2X operation in TS38.101-1 in Rel-17                                                      | 17.1.0 |
| 2021-03 | RAN#91 | RP-210178 | 0607 |   | B | CR on Introduction of completed SUL band combinations into TS 38.101-1                                                   | 17.1.0 |
| 2021-03 | RAN#91 | RP-210096 | 0609 | 2 | B | CR to 38101-1 on introducing new SUL band n99                                                                            | 17.1.0 |
| 2021-03 | RAN#91 | RP-210117 | 0612 |   | A | CR for TS38 101-1 Rel-17 Correction for definition of P-MPR                                                              | 17.1.0 |
| 2021-03 | RAN#91 | RP-210117 | 0614 |   | A | CR for TS38 101-1 Rel-17 Correction of condition for MPR and delta MPR                                                   | 17.1.0 |
| 2021-03 | RAN#91 | RP-210094 | 0616 | 1 | B | CR for TS 38.101-1, Introduce new band combination of V2X_n41A-n47A                                                      | 17.1.0 |
| 2021-03 | RAN#91 | RP-210179 | 0617 |   | B | CR on Introducing NR inter-band CA for 3DL Bands and 1UL band for 38.101-1                                               | 17.1.0 |
| 2021-03 | RAN#91 | RP-210094 | 0625 |   | F | Revision of inter-band V2X con-currency table for V2X_n39A-n47A and V2X_n40A-n47A                                        | 17.1.0 |
| 2021-03 | RAN#91 | RP-210092 | 0628 | 1 | B | Switching time mask for 2Tx-2Tx switching between two carriers and 1Tx-2Tx/2Tx-2Tx switching between two bands in Rel-17 | 17.1.0 |
| 2021-03 | RAN#91 | RP-210082 | 0630 |   | F | CR for TS 38.101-1: Correction on 1Tx-2Tx switching between two uplink carriers (Rel-17)                                 | 17.1.0 |
| 2021-03 | RAN#91 | RP-210092 | 0631 |   | B | CR on introducing NR SUL bands n80 to UL-MIMO configuration                                                              | 17.1.0 |
| 2021-03 | RAN#91 | RP-210091 | 0633 |   | A | CR for 38.101-1: Update of missing fallback NR-DC combinations Rel-17                                                    | 17.1.0 |
| 2021-03 | RAN#91 | RP-210184 | 0636 | 1 | B | CR on introduction of completed NR CA/DC combs with 4DL/2UL within FR1                                                   | 17.1.0 |
| 2021-03 | RAN#91 | RP-210091 | 0642 |   | A | CR on introduction of shorter Transient Period Capability                                                                | 17.1.0 |
| 2021-03 | RAN#91 | RP-210100 | 0657 |   | B | CR introduction completed band combinations Rel-17 NR Intra-band -                                                       | 17.1.0 |
| 2021-03 | RAN#91 | RP-210091 | 0660 |   | A | CR for 38.101-1 to add missing spurious emissions for band n38 UE co-existence (Rel-17)                                  | 17.1.0 |
| 2021-03 | RAN#91 | RP-210084 | 0663 |   | A | CR to TS 38.101-1: system parameters maintenance for NR-U                                                                | 17.1.0 |
| 2021-03 | RAN#91 | RP-210117 | 0665 |   | A | Simplification of n70                                                                                                    | 17.1.0 |
| 2021-03 | RAN#91 | RP-210074 | 0669 |   | A | CR for 38.101-1: Add CA_n25A-n41(2A)-n71A which was missing in the CR implementation                                     | 17.1.0 |
| 2021-03 | RAN#91 | RP-210189 | 0670 | 1 | F | Big CR to TS 38.101-1 - New CBW Basket WI                                                                                | 17.1.0 |
| 2021-03 | RAN#91 | RP-210117 | 0674 |   | A | CR to TS38.101-1: Correction on applicability of minimum requirements                                                    | 17.1.0 |
| 2021-03 | RAN#91 | RP-210117 | 0677 |   | A | CR to TS38.101-1: Correction on the Aggregated Channel Bandwidth                                                         | 17.1.0 |
| 2021-03 | RAN#91 | RP-210117 | 0679 |   | A | CR to TS38.101-1: Correction on configured transmitted power requirement                                                 | 17.1.0 |
| 2021-03 | RAN#91 | RP-210100 | 0680 | 1 | B | Rel-17 CR 38.101-1 for improvements Intra-band tables                                                                    | 17.1.0 |
| 2021-03 | RAN#91 | RP-210101 | 0681 |   | F | Rel-17 CR 38.101-1 for corrections NR CA 2, 3 and 4 band configuration tables                                            | 17.1.0 |
| 2021-03 | RAN#91 | RP-210099 | 0688 |   | B | CR for TS 38.101-1 Introduce NR SUL bands to PC3 UL-MIMO configuration                                                   | 17.1.0 |
| 2021-03 | RAN#91 | RP-210117 | 0690 |   | A | Missing parent clause for NR-DC PCMAX                                                                                    | 17.1.0 |
| 2021-03 | RAN#91 | RP-210117 | 0692 |   | A | Corrections to PCMAX for UL CA                                                                                           | 17.1.0 |
| 2021-03 | RAN#91 | RP-210082 | 0695 |   | A | CR CA_n7B REFSSENS                                                                                                       | 17.1.0 |
| 2021-03 | RAN#91 | RP-210117 | 0699 |   | A | CR for TS 38.101-1: Correction to FR1 time mask for SRS antenna switching                                                | 17.1.0 |
| 2021-03 | RAN#91 | RP-210082 | 0701 |   | A | CR for TS 38.101-1: Corrections to intra-band UL NC CA requirements                                                      | 17.1.0 |
| 2021-03 | RAN#91 | RP-210091 | 0703 |   | A | CR for TS 38.101-1: Cleanup for spurious emissions for UE co-existence table                                             | 17.1.0 |
| 2021-03 | RAN#91 | RP-210091 | 0713 |   | A | CR on TS 38.101-1 NS_49                                                                                                  | 17.1.0 |
| 2021-03 | RAN#91 | RP-210176 | 0715 |   | B | CR to reflect the completed NR inter band CA DC combinations for 2 bands DL with up to 2 bands UL into TS 38.101-1       | 17.1.0 |
| 2021-03 | RAN#91 | RP-210181 | 0716 |   | B | CR to reflect the completed NR inter band CA DC combinations for 3 bands DL with 2 bands UL into TS 38.101-1             | 17.1.0 |
| 2021-03 | RAN#91 | RP-210101 | 0717 |   | B | Introduction of specific Pmax requirements for inter-band CA category A-B combos                                         | 17.1.0 |
| 2021-06 | RAN#92 | RP-211084 | 0736 |   | A | Update of FR1 UL RMC tables                                                                                              | 17.2.0 |
| 2021-06 | RAN#92 | RP-211104 | 0738 |   | F | CR Removal of square brackets from n48 NS_27 R17 CAT F                                                                   | 17.2.0 |

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| 2021-06 | RAN#92 | RP-211114 | 0740 |   | A | CR TDD Intraband CA REFSSENS requirement issue R17                                                                 | 17.2.0 |
| 2021-06 | RAN#92 | RP-211118 | 0745 | 1 | A | CR on PC1.5 HPUE SAR issue into Rel-17 TS 38.101-1                                                                 | 17.2.0 |
| 2021-06 | RAN#92 | RP-211104 | 0750 |   | A | CR on spurious emission between n40 and n41 into Rel-17 TS 38.101-1                                                | 17.2.0 |
| 2021-06 | RAN#92 | RP-211085 | 0751 |   | F | Simplification of n70                                                                                              | 17.2.0 |
| 2021-06 | RAN#92 | RP-211117 | 0752 | 1 | F | CR for updates related to n24 in 38.101-1                                                                          | 17.2.0 |
| 2021-06 | RAN#92 | RP-211114 | 0755 |   | B | CR on Introducing NR inter-band CA for 3DL Bands and 1UL band for 38.101-1                                         | 17.2.0 |
| 2021-06 | RAN#92 | RP-211114 | 0757 |   | A | Correction on supported channel bandwidth for CA_n39-n41-n79                                                       | 17.2.0 |
| 2021-06 | RAN#92 | RP-211080 | 0760 | 1 | F | Correction of an improper usage of band edge relaxation for MOP                                                    | 17.2.0 |
| 2021-06 | RAN#92 | RP-211085 | 0765 |   | A | CR to TS38.101-1[R17]: Addition of UE co-existence requirements for n40                                            | 17.2.0 |
| 2021-06 | RAN#92 | RP-211115 | 0768 |   | B | CR for P <sub>cm</sub> ax - NR-DC for DC cat. A-B combinations                                                     | 17.2.0 |
| 2021-06 | RAN#92 | RP-211114 | 0770 |   | B | Add channel bandwidth configuration for CA_n46A-n48A                                                               | 17.2.0 |
| 2021-06 | RAN#92 | RP-211114 | 0773 |   | B | Adding new CA_n46N-n48A configurations                                                                             | 17.2.0 |
| 2021-06 | RAN#92 | RP-211077 | 0779 |   | A | Cleanup for UE co-existence 38.101-1 Rel-17                                                                        | 17.2.0 |
| 2021-06 | RAN#92 | RP-211102 | 0780 | 1 | F | Correction on DL interruption applicability for inter-band CA                                                      | 17.2.0 |
| 2021-06 | RAN#92 | RP-211079 | 0781 |   | F | CR to TS 38.101-1 on UE channel bandwidth per operating band                                                       | 17.2.0 |
| 2021-06 | RAN#92 | RP-211105 | 0783 |   | A | UL MIMO coherence for Tx switching between two carriers (Rel-17)                                                   | 17.2.0 |
| 2021-06 | RAN#92 | RP-211115 | 0784 |   | B | CR on introduction of completed NR CA/DC combs with 4DL/2UL within FR1                                             | 17.2.0 |
| 2021-06 | RAN#92 | RP-211077 | 0786 |   | A | CR to 38.101-1 for missing MSD due to receiver harmonic mixing for combos with n46                                 | 17.2.0 |
| 2021-06 | RAN#92 | RP-211120 | 0787 |   | B | CR on Introduction of completed SUL band combinations into TS 38.101-1                                             | 17.2.0 |
| 2021-06 | RAN#92 | RP-211115 | 0788 |   | B | CR on Introduction of completed 5 bands inter-band CA into TS 38.101-1                                             | 17.2.0 |
| 2021-06 | RAN#92 | RP-211078 | 0792 |   | A | CR for updating the note of mandatory simultaneous Rx/Tx capability for FR1 NR-CA combinations                     | 17.2.0 |
| 2021-06 | RAN#92 | RP-211078 | 0800 |   | A | Correction to MPR for serving cells of intra-band UL CA                                                            | 17.2.0 |
| 2021-06 | RAN#92 | RP-211095 | 0802 |   | A | Corrections to BCS for n46                                                                                         | 17.2.0 |
| 2021-06 | RAN#92 | RP-211095 | 0804 |   | A | Applicability of minimum requirements for shared spectrum access                                                   | 17.2.0 |
| 2021-06 | RAN#92 | RP-211120 | 0805 |   | B | CR to 38.101-1 Introduce RF requirements for HPUE CA with 2 bands downlink and x bands uplink (x=1,2)              | 17.2.0 |
| 2021-06 | RAN#92 | RP-211120 | 0806 |   | B | CR to 38.101-1 Introduce DL interruption clarification for CA conducting Tx Switching                              | 17.2.0 |
| 2021-06 | RAN#92 | RP-211115 | 0807 |   | B | Big CR to TS 38.101-1: Adding channel BW support in existing NR bands                                              | 17.2.0 |
| 2021-06 | RAN#92 | RP-211116 | 0808 | 1 | B | CR to TS 38.101-1: Introduction of band n67                                                                        | 17.2.0 |
| 2021-06 | RAN#92 | RP-211116 | 0809 | 2 | B | CR to TS 38.101-1: Introduction of band n85                                                                        | 17.2.0 |
| 2021-06 | RAN#92 | RP-211095 | 0811 |   | A | CR to 38.101-1 with correction of NR-U 60 MHz and 80 MHz channels                                                  | 17.2.0 |
| 2021-06 | RAN#92 | RP-211086 | 0814 |   | F | CR for Rel-17 38.101-1 to correct some errors in Delta TIB and Delta RIB table                                     | 17.2.0 |
| 2021-06 | RAN#92 | RP-211086 | 0816 |   | A | CR for 38.101-1 Rel17 corrections on power tolerance for intra-band contiguous CA                                  | 17.2.0 |
| 2021-06 | RAN#92 | RP-211101 | 0821 |   | A | CR for 38.101-1 to correct AMPR value for NR V2X NS_52(Rel-17)                                                     | 17.2.0 |
| 2021-06 | RAN#92 | RP-211107 | 0823 |   | A | CR to TS38.101-1: Correction on configured transmitted power for NR non-contiguous CA                              | 17.2.0 |
| 2021-06 | RAN#92 | RP-211115 | 0825 |   | A | CR to TS38.101-1: Add missing CA_n1A-n3A-n78A                                                                      | 17.2.0 |
| 2021-06 | RAN#92 | RP-211115 | 0826 |   | B | CR to reflect the completed NR inter band CA DC combinations for 2 bands DL with up to 2 bands UL into TS 38.101-1 | 17.2.0 |
| 2021-06 | RAN#92 | RP-211115 | 0827 |   | B | CR to reflect the completed NR inter band CA DC combinations for 3 bands DL with 2 bands UL into TS 38.101-1       | 17.2.0 |
| 2021-06 | RAN#92 | RP-211095 | 0836 |   | A | Applicability of requirements for intra-band contiguous CA                                                         | 17.2.0 |
| 2021-06 | RAN#92 | RP-211110 | 0838 |   | A | Correction to Band n48 reference sensitivity                                                                       | 17.2.0 |
| 2021-06 | RAN#92 | RP-211115 | 0843 |   | B | CR 38.101-1 new combinations Rel-17 NR Intra-band                                                                  | 17.2.0 |
| 2021-06 | RAN#92 | RP-211115 | 0844 |   | B | CR 38.101-1 new combinations NR Inter-band 4 bands CA                                                              | 17.2.0 |
| 2021-06 | RAN#92 | RP-211115 | 0845 |   | F | CR 38.101-1 to re-introduce the 3DL/2UL configuration accidentally deleted in R4-2102320                           | 17.2.0 |
| 2021-06 | RAN#92 | RP-211114 | 0847 | 1 | F | Rel-17 CR 38101-1-h10 corrections 1 band NR and 2 band NR CA                                                       | 17.2.0 |
| 2021-06 | RAN#92 | RP-211114 | 0848 | 1 | F | Rel-17 CR 38101-1-h10 corrections 3 band NR CA                                                                     | 17.2.0 |
| 2021-06 | RAN#92 | RP-211115 | 0849 |   | F | CR 38101-1-h10 correction non-contiguous intra-band config table                                                   | 17.2.0 |
| 2021-06 | RAN#92 | RP-211110 | 0864 |   | A | CR for TS 38.101-1 update configured transmitted power for V2X (R17)                                               | 17.2.0 |
| 2021-06 | RAN#92 | RP-211116 | 0870 |   | A | CR for 38.101-1-h10: Corrections to NS_12, NS_13, NS_14, NS_15                                                     | 17.2.0 |
| 2021-06 | RAN#92 | RP-211114 | 0871 |   | A | CR for correction of Rel-17 NR inter-band CA DC configuration for 2DL with up to 2 bands UL                        | 17.2.0 |
| 2021-06 | RAN#92 | RP-211122 | 0872 |   | B | Big CR for 38.101, Introduce new band combinations for V2X concurrent operation                                    | 17.2.0 |
| 2021-06 | RAN#92 | RP-211114 | 0873 |   | F | Rel-17 CR 38101-1-g70 corrections                                                                                  | 17.2.0 |
| 2021-06 | RAN#92 | RP-211080 | 0874 |   | F | CR for 38.101-1-h10: Corrections to intra-band non-contiguous CA REFSSENS                                          | 17.2.0 |

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| 2021-06 | RAN#92 | RP-211114 | 0875 |   | F | CR for TS 38.101-1: introduction of MSD test configurations related to IMD for inter-band combinations with intra-band UL CA as UL configuration           | 17.2.0 |
| 2021-09 | RAN#93 | RP-211915 | 0884 |   | B | CR on Introducing NR inter-band CA for 3DL Bands and 1UL band for 38.101-1                                                                                 | 17.3.0 |
| 2021-09 | RAN#93 | RP-211909 | 0885 | 2 | B | bigCR to TS 38.101-1 - Introduction of 35MHz and 45MHz channel bandwidth                                                                                   | 17.3.0 |
| 2021-09 | RAN#93 | RP-211896 | 0888 | 1 | F | CR for updates related to NR Band n24                                                                                                                      | 17.3.0 |
| 2021-09 | RAN#93 | RP-211900 | 0889 |   | B | Big CR on introduction of completed NR CA/DC combs with 4DL/2UL within FR1                                                                                 | 17.3.0 |
| 2021-09 | RAN#93 | RP-211901 | 0890 | 1 | B | CR to 38.101-1 Introduce SAR solution for UE power class 2 NR inter-band CA and SUL configurations                                                         | 17.3.0 |
| 2021-09 | RAN#93 | RP-211901 | 0891 |   | B | CR to 38.101-1 Introduce RF requirements for HPUE CA with 2 bands downlink and x bands uplink (x =1,2)                                                     | 17.3.0 |
| 2021-09 | RAN#93 | RP-211902 | 0893 |   | B | CR on Introduction of completed SUL band combinations into TS 38.101-1                                                                                     | 17.3.0 |
| 2021-09 | RAN#93 | RP-211900 | 0894 |   | B | CR on Introduction of completed 5 bands inter-band CA into TS 38.101-1                                                                                     | 17.3.0 |
| 2021-09 | RAN#93 | RP-211901 | 0896 |   | F | CR to TS 38.101-1: Correction on PC2 1UL 2DL table 6.2A.1.3-2                                                                                              | 17.3.0 |
| 2021-09 | RAN#93 | RP-211900 | 0898 |   | B | Big CR to reflect the completed NR inter band CA DC combinations for 2 bands DL with up to 2 bands UL into TS 38.101-1                                     | 17.3.0 |
| 2021-09 | RAN#93 | RP-211900 | 0899 |   | B | Big CR to reflect the completed NR inter band CA DC combinations for 3 bands DL with 2 bands UL into TS 38.101-1                                           | 17.3.0 |
| 2021-09 | RAN#93 | RP-211900 | 0903 |   | B | CR 38.101-1 new combinations Rel-17 NR Intra-band                                                                                                          | 17.3.0 |
| 2021-09 | RAN#93 | RP-211900 | 0904 |   | B | CR 38.101-1 new combinations NR Inter-band 4 bands CA                                                                                                      | 17.3.0 |
| 2021-09 | RAN#93 | RP-211907 | 0905 |   | B | Big CR to TS 38.101-1: Adding channel BW support in existing NR bands                                                                                      | 17.3.0 |
| 2021-09 | RAN#93 | RP-211896 | 0906 |   | B | CR for 38.101-1: Introduction of BCS4 and BCS5                                                                                                             | 17.3.0 |
| 2021-09 | RAN#93 | RP-211900 | 0907 |   | F | CR for TS 38.101-1: Correcting CA frequency setup for 2UL interband reference sensitivity                                                                  | 17.3.0 |
| 2021-09 | RAN#93 | RP-211895 | 0908 | 1 | F | CR for TS 38.101-1 Rel-17: Applying n40 and n41 spurious emissions on CA                                                                                   | 17.3.0 |
| 2021-09 | RAN#93 | RP-211910 | 0911 | 1 | B | Introduction of the UL 7.5kHz shift for NR TDD band n34 and n39                                                                                            | 17.3.0 |
| 2021-09 | RAN#93 | RP-211895 | 0912 |   | B | CR on contiguous CA with UL MIMO for power class 3                                                                                                         | 17.3.0 |
| 2021-09 | RAN#93 | RP-211895 | 0913 | 1 | B | CR on PC2 intra-band UL contiguous CA RF requirements                                                                                                      | 17.3.0 |
| 2021-09 | RAN#93 | RP-211897 | 0914 |   | B | CR for TS 38.101-1 Tx diversity requirements                                                                                                               | 17.3.0 |
|         |        |           |      |   |   | NOTE: The CR is partly implemented. .The changes were ignored in CR0914's regarding PC1.5 in clause 6.2.2 due to conflict with CR0915                      |        |
| 2021-09 | RAN#93 | RP-211901 | 0915 |   | B | CR to 38.101-1: Introduction of PC1.5 in Bands n77 and n78                                                                                                 | 17.3.0 |
| 2021-09 | RAN#93 | RP-211901 | 0916 |   | B | CR to 38.101-1: Introduction of PC1.5 in Band n79                                                                                                          | 17.3.0 |
| 2021-09 | RAN#93 | RP-211888 | 0917 |   | F | CR to 38.101-1: PC1.5 MPR for Band n41                                                                                                                     | 17.3.0 |
| 2021-09 | RAN#93 | RP-211901 | 0918 |   | B | CR to TS 38.101-1: Addition of PC2 A-MPR for NS_50                                                                                                         | 17.3.0 |
| 2021-09 | RAN#93 | RP-211921 | 0921 |   | F | Big CR for TS 38.101-1 Maintenance part1 (Rel-17)                                                                                                          | 17.3.0 |
| 2021-09 | RAN#93 | RP-211907 | 0923 |   | A | Big CR for TS 38.101-1 Maintenance part2 (Rel-17)                                                                                                          | 17.3.0 |
| 2021-09 | RAN#93 | RP-211900 | 0924 |   | F | Rel-17 CR 38.101-1, band combination corrections                                                                                                           | 17.3.0 |
| 2021-09 | RAN#93 | RP-211905 | 0925 |   | B | CR for updating the note of mandatory simultaneous Rx/Tx capability for Rel.17 FR1 NR-CA combinations                                                      | 17.3.0 |
| 2021-09 | RAN#93 | RP-212600 | 0927 | 2 | A | Introduction of NS value for distinguishing support of extended n77                                                                                        | 17.3.0 |
| 2021-12 | RAN#94 | RP-212837 | 0930 |   | F | Clarification on applicability of RB restriction for n39 and n98                                                                                           | 17.4.0 |
| 2021-12 | RAN#94 | RP-212837 | 0932 | 1 | B | CR on PC2 UE RF requirements of n34 in Rel-17 TS 38.101-1                                                                                                  | 17.4.0 |
| 2021-12 | RAN#94 | RP-212837 | 0933 |   | B | CR on PC2 UE RF requirements of n39 in Rel-17 TS 38.101-1                                                                                                  | 17.4.0 |
| 2021-12 | RAN#94 | RP-212830 | 0940 |   | B | CR on Introducing NR inter-band CA for 3DL Bands and 1UL band for 38.101-1                                                                                 | 17.4.0 |
| 2021-12 | RAN#94 | RP-212826 | 0941 |   | F | CR for 38.101-1 to remove UL MIMO restriction for SUL carrier                                                                                              | 17.4.0 |
| 2021-12 | RAN#94 | RP-212833 | 0942 |   | B | CR on UE maximum output power for n1 and n3 PC2                                                                                                            | 17.4.0 |
| 2021-12 | RAN#94 | RP-212825 | 0944 | 1 | B | CR for TS 38.101-1: 1024QAM                                                                                                                                | 17.4.0 |
| 2021-12 | RAN#94 | RP-212831 | 0945 |   | B | Big CR on introduction of completed NR CA/DC combs with 4DL/2UL within FR1                                                                                 | 17.4.0 |
| 2021-12 | RAN#94 | RP-212836 | 0947 |   | F | CR: Rel-17 38.101-1 Corrections on spurious emission band UE co-existence                                                                                  | 17.4.0 |
| 2021-12 | RAN#94 | RP-212830 | 0948 | 1 | F | CR for TS 38.101-1: MSD test configurations modification for US inter-band CA combinations with n77                                                        | 17.4.0 |
| 2021-12 | RAN#94 | RP-212835 | 0949 | 1 | F | CR for TS 38.101-1: Remove unsupported channel BWs for n25 and n79                                                                                         | 17.4.0 |
| 2021-12 | RAN#94 | RP-212835 | 0950 |   | B | Big CR to TS 38.101-1: Adding channel BW support in existing NR bands                                                                                      | 17.4.0 |
| 2021-12 | RAN#94 | RP-212832 | 0951 | 1 | F | CR to TS38.101-1: Correction on MSD table to apply PC2 NR inter-band CA combination                                                                        | 17.4.0 |
| 2021-12 | RAN#94 | RP-212830 | 0952 |   | F | CR to TS38.101-1: Inter-band NR CA Tx requirement including intra-band non-contiguous CA and combinations of intra-band and inter-band CA UL configuration | 17.4.0 |

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| 2021-12 | RAN#94 | RP-212830 | 0953 |   | B | Big CR to reflect the completed NR inter band CA DC combinations for 2 bands DL with up to 2 bands UL into TS 38.101-1                                                                                                                                                                                                                                | 17.4.0 |
| 2021-12 | RAN#94 | RP-212830 | 0954 |   | B | Big CR to reflect the completed NR inter band CA DC combinations for 3 bands DL with 2 bands UL into TS 38.101-1                                                                                                                                                                                                                                      | 17.4.0 |
| 2021-12 | RAN#94 | RP-212832 | 0955 |   | B | CR to 38.101-1 Introduce RF requirements for HPUE CA with 2 bands downlink and x bands uplink (x =1,2)                                                                                                                                                                                                                                                | 17.4.0 |
| 2021-12 | RAN#94 | RP-212834 | 0956 |   | B | CR to 38.101-1 Introduce DL interruption clarification for CA conducting Tx Switching                                                                                                                                                                                                                                                                 | 17.4.0 |
| 2021-12 | RAN#94 | RP-212831 | 0957 |   | B | CR on Introduction of completed SUL band combinations into TS 38.101-1                                                                                                                                                                                                                                                                                | 17.4.0 |
| 2021-12 | RAN#94 | RP-212831 | 0958 |   | B | CR on Introduction of completed 5 bands inter-band CA into TS 38.101-1                                                                                                                                                                                                                                                                                | 17.4.0 |
| 2021-12 | RAN#94 | RP-212830 | 0959 |   | B | CR 38.101-1 new combinations Rel-17 NR Intra-band                                                                                                                                                                                                                                                                                                     | 17.4.0 |
| 2021-12 | RAN#94 | RP-212831 | 0960 |   | B | CR 38.101-1 new combinations NR Inter-band 4 bands CA                                                                                                                                                                                                                                                                                                 | 17.4.0 |
| 2021-12 | RAN#94 | RP-212904 | 0961 |   | B | CR for 38.101-1 to introduce PC2 RF requirements for NR V2X                                                                                                                                                                                                                                                                                           | 17.4.0 |
| 2021-12 | RAN#94 | RP-212837 | 0973 | 1 | F | Correction to maxUplinkDutyCycle-MPE-FR1 for PC1.5                                                                                                                                                                                                                                                                                                    | 17.4.0 |
| 2021-12 | RAN#94 | RP-212832 | 0974 |   | F | Correction to uplink Tx power for PC2 2UL CA MSD                                                                                                                                                                                                                                                                                                      | 17.4.0 |
| 2021-12 | RAN#94 | RP-212847 | 0977 |   | A | CR to remove LO exceptions                                                                                                                                                                                                                                                                                                                            | 17.4.0 |
| 2021-12 | RAN#94 | RP-212832 | 0979 |   | B | CR to 38.101-1 Introduce RF requirements for HPUE CA with x (x>2) bands DL and y (y=1,2) bands UL                                                                                                                                                                                                                                                     | 17.4.0 |
| 2021-12 | RAN#94 | RP-212827 | 0980 |   | B | CR 38.101-1 to improve how to include BCS4 and BCS5                                                                                                                                                                                                                                                                                                   | 17.4.0 |
| 2021-12 | RAN#94 | RP-212845 | 0983 |   | F | Big CR for TS 38.101-1 Maintenance (Rel-17)                                                                                                                                                                                                                                                                                                           | 17.4.0 |
| 2021-12 | RAN#94 | RP-213687 | 0984 | 1 | B | Bandwidth class correction for DC_n46N-n48A DC_n46N-n48B DC_n46N-n48C combos                                                                                                                                                                                                                                                                          | 17.4.0 |
| 2022-03 | RAN#95 | RP-220357 | 0990 | 1 | B | CR for introduction of the lower 6GHz unlicensed band                                                                                                                                                                                                                                                                                                 | 17.5.0 |
| 2022-03 | RAN#95 | RP-220357 | 0991 | 1 | B | CR for introduction of operation in full unlicensed band 5925-7125MHz                                                                                                                                                                                                                                                                                 | 17.5.0 |
| 2022-03 | RAN#95 | RP-220342 | 0993 |   | F | CR on UL MIMO coherence for Tx switching                                                                                                                                                                                                                                                                                                              | 17.5.0 |
| 2022-03 | RAN#95 | RP-220359 | 0994 |   | B | CR on Introducing NR inter-band CA for 3DL Bands and 1UL band for 38.101-1                                                                                                                                                                                                                                                                            | 17.5.0 |
| 2022-03 | RAN#95 | RP-220359 | 0995 |   | B | Big CR to reflect the completed NR inter band CA DC combinations for 3 bands DL with 2 bands UL into TS 38.101-1                                                                                                                                                                                                                                      | 17.5.0 |
| 2022-03 | RAN#95 | RP-220352 | 0996 |   | B | CR for 4 Rx antenna ports support of band n8                                                                                                                                                                                                                                                                                                          | 17.5.0 |
| 2022-03 | RAN#95 | RP-220343 | 0997 |   | B | Big CR to 38.101-1 Introduce RF requirements for HPUE CA                                                                                                                                                                                                                                                                                              | 17.5.0 |
| 2022-03 | RAN#95 | RP-220343 | 0998 | 1 | B | CR to TS38101-1 Addition of MSD for FDD PC2                                                                                                                                                                                                                                                                                                           | 17.5.0 |
| 2022-03 | RAN#95 | RP-220343 | 0999 | 1 | B | CR to TS38101-1 Addition of PC2 A-MPR for FDD PC2                                                                                                                                                                                                                                                                                                     | 17.5.0 |
| 2022-03 | RAN#95 | RP-220359 | 1000 | 1 | F | CR to TS38101-1 Addition of DC configurations                                                                                                                                                                                                                                                                                                         | 17.5.0 |
| 2022-03 | RAN#95 | RP-220359 | 1001 | 1 | F | Clarification of A-MPR/NS applicability for inter-band NR-DC                                                                                                                                                                                                                                                                                          | 17.5.0 |
| 2022-03 | RAN#95 | RP-220365 | 1002 |   | B | Formal big CR to introduce SL enhancements UE RF requirements in Rel-17                                                                                                                                                                                                                                                                               | 17.5.0 |
| 2022-03 | RAN#95 | RP-220358 | 1003 |   | B | Big CR for 38.101-1, Introduce new band combination for V2X concurrent operation                                                                                                                                                                                                                                                                      | 17.5.0 |
| 2022-03 | RAN#95 | RP-220358 | 1004 |   | B | Big CR for 38.101-3, Introduce new band combination for V2X concurrent operation<br><br>NOTE: The CR is allocated to 38.101-1 but was used for 38.101-3. The changes were ignored in CR1004 since it is not the correct spec. CR 1003 is related to 38.101-1. The changes in CR1004 will be implemented in 38.101-3 due to conflict with CR numbering | 17.5.0 |
| 2022-03 | RAN#95 | RP-220343 | 1005 |   | B | Big CR to 38.101-1 Introduce RF requirements for HPUE CA with 2 bands downlink and x bands uplink (x =1,2)                                                                                                                                                                                                                                            | 17.5.0 |
| 2022-03 | RAN#95 | RP-220347 | 1007 | 1 | B | Introduction of upper 700MHz A block into TS 38.101                                                                                                                                                                                                                                                                                                   | 17.5.0 |
| 2022-03 | RAN#95 | RP-220359 | 1008 |   | B | Big CR on introduction of completed NR CA/DC combs with 4DL/2UL within FR1                                                                                                                                                                                                                                                                            | 17.5.0 |
| 2022-03 | RAN#95 | RP-220359 | 1009 |   | B | Big CR to reflect the completed NR inter band CA DC combinations for 2 bands DL with up to 2 bands UL into TS 38.101-1                                                                                                                                                                                                                                | 17.5.0 |
| 2022-03 | RAN#95 | RP-220376 | 1011 |   | B | 38.101-1: Introduction of 1900 MHz to 5G NR for RMR                                                                                                                                                                                                                                                                                                   | 17.5.0 |
| 2022-03 | RAN#95 | RP-220343 | 1013 |   | F | CR to TS38.101-1: Corrections on MOP tolerance for PC2 FDD n3                                                                                                                                                                                                                                                                                         | 17.5.0 |
| 2022-03 | RAN#95 | RP-220358 | 1015 |   | B | Big CR to TS 38.101-1: Adding channel BW support in existing NR bands                                                                                                                                                                                                                                                                                 | 17.5.0 |
| 2022-03 | RAN#95 | RP-220359 | 1016 | 1 | F | CR for TS 38.101-1 Rel-17: Corrections on UE co-existence                                                                                                                                                                                                                                                                                             | 17.5.0 |
| 2022-03 | RAN#95 | RP-220359 | 1017 |   | B | CR on Introduction of completed 5 bands inter-band CA into TS 38.101-1                                                                                                                                                                                                                                                                                | 17.5.0 |
| 2022-03 | RAN#95 | RP-220371 | 1019 | 2 | B | CR for 38.101-1 to introduce RF requirements for RedCap UE                                                                                                                                                                                                                                                                                            | 17.5.0 |
| 2022-03 | RAN#95 | RP-220344 | 1020 |   | B | CR for 38.101-1 to correct the REFSSENS errors due to the new format(n41 n77 n78) (R17)                                                                                                                                                                                                                                                               | 17.5.0 |
| 2022-03 | RAN#95 | RP-220349 | 1021 |   | B | Big CR for TS 38.101-1 Tx diversity requirements (phase 2)                                                                                                                                                                                                                                                                                            | 17.5.0 |
| 2022-03 | RAN#95 | RP-220342 | 1022 |   | B | Big CR for TS 38.101-1 introduction of PC2 intra-band non-contiguous UL CA                                                                                                                                                                                                                                                                            | 17.5.0 |
| 2022-03 | RAN#95 | RP-220342 | 1023 | 1 | B | Big CR for TS 38.101-1 contiguous CA with UL MIMO for power class 2                                                                                                                                                                                                                                                                                   | 17.5.0 |
| 2022-03 | RAN#95 | RP-220363 | 1024 | 1 | B | Big CR for TS38.101-1: introduction of new UL MIMO bands                                                                                                                                                                                                                                                                                              | 17.5.0 |



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| 2022-03 | RAN#95 | RP-220359 | 1025 |   | B | Big CR 38.101-1 new combinations Rel-17 NR Intra-band                                                                  | 17.5.0 |
| 2022-03 | RAN#95 | RP-220359 | 1026 |   | B | Big CR 38.101-1 new combinations NR CA Inter-band 4DL/1UL                                                              | 17.5.0 |
| 2022-03 | RAN#95 | RP-220350 | 1027 |   | F | Clarification of modifiedMPR-Behavior for PC1.5                                                                        | 17.5.0 |
| 2022-03 | RAN#95 | RP-220344 | 1030 |   | F | CR R17 TS38.101-1 on TDD REFSSENS and MSDs                                                                             | 17.5.0 |
| 2022-03 | RAN#95 | RP-220334 | 1031 |   | F | CR to R17 TS38.101-1 on MSD for CA n5-n28                                                                              | 17.5.0 |
| 2022-03 | RAN#95 | RP-220353 | 1032 |   | F | Big CRs to TS 38.101-1 for NR BCS4                                                                                     | 17.5.0 |
| 2022-03 | RAN#95 | RP-220343 | 1033 |   | B | CR to TS 38.101-1 on PC1 MPR table                                                                                     | 17.5.0 |
| 2022-03 | RAN#95 | RP-220360 | 1034 |   | B | CR on UE RF requirements for DMRS bundling in TS 38.101-1                                                              | 17.5.0 |
|         |        |           |      |   |   | NOTE: The CR was not implemented.                                                                                      |        |
| 2022-03 | RAN#95 | RP-220337 | 1037 |   | F | Big CR for TS 38.101-1 Maintenance Part-1 (Rel-17)                                                                     | 17.5.0 |
| 2022-03 | RAN#95 | RP-220337 | 1039 |   | F | Big CR for TS 38.101-1 Maintenance Part-2 (Rel-17)                                                                     | 17.5.0 |
| 2022-03 | RAN#95 | RP-220360 | 1040 |   | B | CR on measurement for DMRS bundling in TS 38.101-1                                                                     | 17.5.0 |
| 2022-03 | RAN#95 | RP-220360 | 1041 |   | B | CR on measurement for DMRS bundling in TS 38.101-1                                                                     | 17.5.0 |
| 2022-03 | RAN#95 | RP-220371 | 1042 |   | B | Big CR on RedCap UE FR1-RX                                                                                             | 17.5.0 |
| 2022-03 | RAN#95 | RP-220786 | 1043 |   | C | Mandatory 70 MHz and 90 MHz RF channel bandwidth in TS 38.101-1                                                        | 17.5.0 |
| 2022-06 | RAN#96 | RP-221656 | 1048 | 1 | F | V2X intra-band con-current operation                                                                                   | 17.6.0 |
| 2022-06 | RAN#96 | RP-221677 | 1049 |   | B | CR 38.101-1 DMRS for CA                                                                                                | 17.6.0 |
| 2022-06 | RAN#96 | RP-221654 | 1050 | 1 | F | CR 38101-1-h50 adding FR1 NR-CA fallbacks                                                                              | 17.6.0 |
| 2022-06 | RAN#96 | RP-221661 | 1051 | 1 | F | CR: Update of UE capability and RRC parameter name for Tx switching                                                    | 17.6.0 |
| 2022-06 | RAN#96 | RP-221666 | 1053 |   | A | CR for 38.101-1-h50: Correction for n7 A-MPR (NS_46)                                                                   | 17.6.0 |
| 2022-06 | RAN#96 | RP-221668 | 1057 |   | A | CR for 38.101-1 Rel17 Minor AMPR Corrections for n65 to account for SCS                                                | 17.6.0 |
| 2022-06 | RAN#96 | RP-221671 | 1058 |   | F | CR for 38.101-1 Rel17 Minor Correction for n48 NS_27 30MHz inequality                                                  | 17.6.0 |
| 2022-06 | RAN#96 | RP-221695 | 1063 |   | B | Big CR for TS 38.101-1, Introduce new band combinations of V2X con-current operation                                   | 17.6.0 |
| 2022-06 | RAN#96 | RP-221686 | 1064 |   | B | CR on Introducing NR inter-band CA for 3DL Bands and 1UL band for 38.101-1                                             | 17.6.0 |
| 2022-06 | RAN#96 | RP-221694 | 1065 |   | B | Big CR to 38.101-1 Introduce RF requirements for HPUE CA with 2 bands downlink and x bands uplink (x =1,2)             | 17.6.0 |
| 2022-06 | RAN#96 | RP-221672 | 1067 | 1 | F | CR on NR-U A-MPR for PC5 VLP in South Korea                                                                            | 17.6.0 |
| 2022-06 | RAN#96 | RP-221679 | 1070 | 1 | F | CR to TS 38.101-1: Protection for band 103 from newly introduced CA combinations                                       | 17.6.0 |
| 2022-06 | RAN#96 | RP-221661 | 1071 | 1 | F | CR to TS38.101-1[R17] Some Corrections for Transmitter characteristics                                                 | 17.6.0 |
| 2022-06 | RAN#96 | RP-221683 | 1072 | 1 | F | CR to TS38.101-1: Some corrections for the tables due to introduction of 35MHz_45MHz CBW                               | 17.6.0 |
| 2022-06 | RAN#96 | RP-221676 | 1073 | 1 | F | CR to TS38.101-1: Corrections on Redcap requirements                                                                   | 17.6.0 |
| 2022-06 | RAN#96 | RP-221687 | 1074 | 1 | F | CR to TS38.101-1: Corrections on MSD for PC2 FDD band                                                                  | 17.6.0 |
| 2022-06 | RAN#96 | RP-221686 | 1075 |   | B | Big CR to reflect the completed NR inter band CA DC combinations for 2 bands DL with up to 2 bands UL into TS 38.101-1 | 17.6.0 |
| 2022-06 | RAN#96 | RP-221671 | 1077 |   | F | Correction to additional spurious emission requirements for n48                                                        | 17.6.0 |
| 2022-06 | RAN#96 | RP-221681 | 1079 | 1 | F | CR to TS38.101-1 for the corrections on Tx Diversity Requirement                                                       | 17.6.0 |
| 2022-06 | RAN#96 | RP-221671 | 1080 |   | B | Big CR to TS 38.101-1: Adding channel BW support in existing NR bands                                                  | 17.6.0 |
| 2022-06 | RAN#96 | RP-221695 | 1081 | 1 | B | Big CR to 38.101-1: update of simultaneous RxTx capability for band combinations                                       | 17.6.0 |
| 2022-06 | RAN#96 | RP-221675 | 1082 |   | B | CR: Introduction of RMC for 1024QAM maximum input level                                                                | 17.6.0 |
| 2022-06 | RAN#96 | RP-221684 | 1083 |   | B | 38.101-1: Introduction of 900 MHz to 5G NR for RMR                                                                     | 17.6.0 |
| 2022-06 | RAN#96 | RP-221677 | 1086 |   | B | CR on UE RF requirements for DMRS bundling in TS 38.101-1                                                              | 17.6.0 |
| 2022-06 | RAN#96 | RP-221694 | 1087 |   | B | Big CR to 38.101-1 Introduce RF requirements for HPUE CA                                                               | 17.6.0 |
| 2022-06 | RAN#96 | RP-221686 | 1089 |   | B | Big CR on Introduction of completed SUL band combinations into TS 38.101-1                                             | 17.6.0 |
| 2022-06 | RAN#96 | RP-221686 | 1090 |   | B | Big CR on Introduction of completed 5 bands inter-band CA into TS 38.101-1                                             | 17.6.0 |
| 2022-06 | RAN#96 | RP-221694 | 1092 | 1 | F | CR for TS 38.101-1 Rel-17: Corrections on band combinations for UE co-existence                                        | 17.6.0 |
| 2022-06 | RAN#96 | RP-221680 | 1098 |   | F | CR for 38.101-1 to introduce the missing requirements for BCS4                                                         | 17.6.0 |
| 2022-06 | RAN#96 | RP-221677 | 1100 | 1 | F | CR on DMRS bundling phase offset measurement FR1                                                                       | 17.6.0 |
| 2022-06 | RAN#96 | RP-221686 | 1103 |   | B | big CR 38.101-1 new combinations Rel-17 NR Intra-band                                                                  | 17.6.0 |
| 2022-06 | RAN#96 | RP-221686 | 1104 |   | B | big CR 38.101-1 new combinations NR CA Inter-band 4DL/1UL                                                              | 17.6.0 |
| 2022-06 | RAN#96 | RP-221686 | 1105 |   | B | Big CR to reflect the completed NR inter band CA DC combinations for 3 bands DL with 2 bands UL into TS 38.101-1       | 17.6.0 |
| 2022-06 | RAN#96 | RP-221670 | 1107 |   | B | Big CR for TS38.101-1: introduction of new UL MIMO bands                                                               | 17.6.0 |
| 2022-06 | RAN#96 | RP-221677 | 1110 |   | F | CR to TS 38.101-1: update of NR-V2X MPR requirements (R17)                                                             | 17.6.0 |
| 2022-06 | RAN#96 | RP-221694 | 1111 | 1 | B | Big CR for TS 38.101-1: Introduce high power UE for NR TDD intra-band CA in FR1                                        | 17.6.0 |
| 2022-06 | RAN#96 | RP-221673 | 1112 | 1 | B | Introduction of NR licensed band 6425 – 7125 MHz                                                                       | 17.6.0 |
|         |        |           |      |   |   | NOTE: The CR is covered in CR 1112 revision2                                                                           |        |

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| 2022-06 | RAN#96 | RP-221673 | 1112 | 2 | B | Introduction of NR licensed band 6425 – 7125 MHz                                                                                                      | 17.6.0 |
| 2022-06 | RAN#96 | RP-221680 | 1113 | 1 | B | Increasing the maximum power limit for inter-band UL CA                                                                                               | 17.6.0 |
| 2022-06 | RAN#96 | RP-221661 | 1116 | 1 | A | CR to R17 TS38.101-1 on transient period capability                                                                                                   | 17.6.0 |
| 2022-06 | RAN#96 | RP-221661 | 1117 |   | F | CR for TS 38.101-1: Removing square brackets for Intra-band NC UL CA requirements                                                                     | 17.6.0 |
| 2022-06 | RAN#96 | RP-221655 | 1121 |   | F | Big CR for TS 38.101-1 Maintenance Part-1 (Rel-17)                                                                                                    | 17.6.0 |
| 2022-06 | RAN#96 | RP-221676 | 1123 |   | F | CR on RedCap FR1 RF                                                                                                                                   | 17.6.0 |
| 2022-06 | RAN#96 | RP-221681 | 1124 |   | F | CR on Receiver requirements for TX diversity                                                                                                          | 17.6.0 |
| 2022-06 | RAN#96 | RP-221066 | 1125 |   | F | CR for updating the note of mandatory simultaneous Rx/Tx capability for FR1 NR-CA combinations                                                        | 17.6.0 |
| 2022-06 | RAN#96 | RP-221067 | 1126 |   | F | CR for updating the note of mandatory simultaneous Rx/Tx capability for FR1 NR-CA combinations                                                        | 17.6.0 |
| 2022-06 | RAN#96 | RP-221868 | 1128 | 2 | F | CR to 38.101-1 on corrections of NS_21 requirements                                                                                                   | 17.6.0 |
| 2022-06 | RAN#96 | RP-221748 | 1129 | 1 | B | CR for 38.101-1: Addition PC1.5 single uplink for 3DL combinations [NR_PC1.5_SingleUL_3DLCA]                                                          | 17.6.0 |
| 2022-06 | RAN#96 | RP-221789 | 1130 | 1 | C | Extension of operation in the n77 frequency range in Canada [n77 Canada]                                                                              | 17.6.0 |
| 2022-09 | RAN#97 | RP-222032 | 1135 | 1 | F | CR: Maintenance of phase continuity requirements for DMRS bundling in FR1                                                                             | 17.7.0 |
| 2022-09 | RAN#97 | RP-222032 | 1136 | 1 | F | V2X corrections                                                                                                                                       | 17.7.0 |
| 2022-09 | RAN#97 | RP-222050 | 1137 |   | F | CR to R17 38.101-1 to correct NR-U 100MHz UL configuration                                                                                            | 17.7.0 |
| 2022-09 | RAN#97 | RP-222050 | 1138 |   | D | CR to R17 38.101-1 to correct table number for UL MIMO NR-U section                                                                                   | 17.7.0 |
| 2022-09 | RAN#97 | RP-222032 | 1139 | 1 | F | CR for TS 38.101-1, Correction of configured transmitted power for V2X                                                                                | 17.7.0 |
| 2022-09 | RAN#97 | RP-222032 | 1140 | 1 | F | NR Band n14 PC1 MPR for NR Sidelink Operation                                                                                                         | 17.7.0 |
| 2022-09 | RAN#97 | RP-222028 | 1143 | 1 | F | CR 38.101-1: Rel-17 Adding missing fallback combinations and bug fixes                                                                                | 17.7.0 |
| 2022-09 | RAN#97 | RP-222036 | 1145 |   | F | CR for TS 38.101-1 Rel-17: Introducing missing UE coex requirements for CA_n7-n79                                                                     | 17.7.0 |
| 2022-09 | RAN#97 | RP-222034 | 1148 |   | F | CR to 38.101-1: Corrections on P <sub>max</sub> for Tx D                                                                                              | 17.7.0 |
| 2022-09 | RAN#97 | RP-222036 | 1149 | 1 | F | CR to 38.101-1: Corrections on P <sub>max</sub> for intra-band contiguous CA with UL MIMO                                                             | 17.7.0 |
| 2022-09 | RAN#97 | RP-222033 | 1150 | 1 | F | CR to 38.101-1 Maintenance for HPUE CA with 2 bands downlink and x bands uplink (x =1,2)                                                              | 17.7.0 |
| 2022-09 | RAN#97 | RP-222036 | 1151 |   | F | Removal of [] for Reference Sensitivity Degradation of PC2 FDD band                                                                                   | 17.7.0 |
| 2022-09 | RAN#97 | RP-222036 | 1152 |   | F | Corrections on the MSD tables for inter-band NR CA                                                                                                    | 17.7.0 |
| 2022-09 | RAN#97 | RP-222034 | 1155 |   | F | Maintenance of NR Tx D Tx requirements                                                                                                                | 17.7.0 |
| 2022-09 | RAN#97 | RP-222036 | 1157 | 1 | F | CR 38.101-1 for editorial corrections to band combination tables                                                                                      | 17.7.0 |
| 2022-09 | RAN#97 | RP-222032 | 1158 |   | F | CR for 38.101-1 to correct the errors for FR1 RedCap UE                                                                                               | 17.7.0 |
| 2022-09 | RAN#97 | RP-222050 | 1159 |   | F | CR for 38.101-1 to update the requirements for V2X con-current band combinations                                                                      | 17.7.0 |
| 2022-09 | RAN#97 | RP-222036 | 1160 | 1 | F | CR for 38.101-1 to introduce the missing MSD due to cross band isolation                                                                              | 17.7.0 |
| 2022-09 | RAN#97 | RP-222036 | 1161 | 1 | F | CR for 38.101-1 to clarify the ambiguity of BCS4 and BCS5                                                                                             | 17.7.0 |
| 2022-09 | RAN#97 | RP-222023 | 1162 |   | A | Mirror CR for 38.101-1 to clarify the applicability of requirements for NS_xxU                                                                        | 17.7.0 |
| 2022-09 | RAN#97 | RP-222023 | 1164 |   | F | CR to 38.101-1 Corrections to tables with wrong unit declarations                                                                                     | 17.7.0 |
| 2022-09 | RAN#97 | RP-222036 | 1165 | 1 | F | NOTE: The CR is allocated to 38.101-1 but the title on the coversheet is wrong as it says spec TS 38.101-3. This 38.101-1 CR. can not be implemented. | 17.7.0 |
| 2022-09 | RAN#97 | RP-222032 | 1167 | 1 | F | CR on RedCap RF to add section 6.1l                                                                                                                   | 17.7.0 |
| 2022-09 | RAN#97 | RP-222036 | 1169 | 1 | F | Correction to RF requirements of NR_RF_FR1_enh                                                                                                        | 17.7.0 |
| 2022-09 | RAN#97 | RP-222032 | 1173 | 1 | F | CR TS 38.101-1: Correction on NR V2X requirements in TS 38.101-1                                                                                      | 17.7.0 |
| 2022-09 | RAN#97 | RP-222028 | 1174 |   | F | CR for TS 38.101-1 on corrections to MOP band edge relaxation for intra-band contiguous and non-contiguous CA band combinations                       | 17.7.0 |
| 2022-09 | RAN#97 | RP-222050 | 1177 |   | F | CR to R17 TS38.101-1 on corrections to NRU 100MHz MPR                                                                                                 | 17.7.0 |
| 2022-09 | RAN#97 | RP-222034 | 1180 | 1 | F | CR for 38.101-1: Corrections for PC2 MPR and PC1.5 fallback to PC2 MPR                                                                                | 17.7.0 |
| 2022-09 | RAN#97 | RP-222036 | 1181 | 1 | B | CR for 38.101-1: Missing combinations for NR-CA                                                                                                       | 17.7.0 |
| 2022-09 | RAN#97 | RP-222050 | 1182 | 1 | B | CR for 38.101-1: Addition of 5 MHz channel BW for n41                                                                                                 | 17.7.0 |
| 2022-09 | RAN#97 | RP-222032 | 1184 | 1 | F | CR 38.101-1 DMRS DL CA                                                                                                                                | 17.7.0 |
| 2022-09 | RAN#97 | RP-222028 | 1187 |   | D | Editorial clean-up                                                                                                                                    | 17.7.0 |
| 2022-09 | RAN#97 | RP-222032 | 1188 |   | F | CR: Correction of DMRS bundling requirements for FR1 CA                                                                                               | 17.7.0 |
| 2022-09 | RAN#97 | RP-222023 | 1192 |   | F | Big CR for 38.101-1 maintenance part1 (Rel-17)                                                                                                        | 17.7.0 |
| 2022-09 | RAN#97 | RP-222023 | 1194 |   | F | Big CR for 38.101-1 maintenance part2 (Rel-17)                                                                                                        | 17.7.0 |
| 2022-09 | RAN#97 | RP-222686 | 1196 | 1 | A | Extension of operation in the n77 frequency range in US [n77 US]                                                                                      | 17.7.0 |
| 2022-09 | RAN#97 | RP-222683 | 1197 | 2 | C | Extension of operation in the n77 frequency range in Canada [n77 Canada]                                                                              | 17.7.0 |

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| 2022-09 | RAN#97   | RP-222490 | 1198 |   | F | CR to 38.101-1 on new NS for Canadian WCS regulation R17                                                                                          | 17.7.0 |
| 2022-12 | RAN#98-e | RP-223298 | 1199 |   | B | Introduction of intra band NC UL CA in the n77 frequency range in Canada [n77 Canada]                                                             | 17.8.0 |
| 2022-12 | RAN#98-e | RP-223307 | 1200 | 1 | F | Corrections on the definition of RedCap UE                                                                                                        | 17.8.0 |
| 2022-12 | RAN#98-e | RP-223306 | 1202 | 1 | F | CR on clarification for DMRS bundling RF requirements for SUL in TS 38.101-1                                                                      | 17.8.0 |
| 2022-12 | RAN#98-e | RP-223308 | 1205 | 3 | F | CR to clarify UE requirements for DMRS bundling                                                                                                   | 17.8.0 |
| 2022-12 | RAN#98-e | RP-223311 | 1206 |   | F | CR for TS 38.101-1, Correction of maximum configured power for PSFCH in Rel-17 sidelink enhancement                                               | 17.8.0 |
| 2022-12 | RAN#98-e | RP-223290 | 1210 |   | A | Addition of FR1 UL MIMO EVM measurement description                                                                                               | 17.8.0 |
| 2022-12 | RAN#98-e | RP-223290 | 1213 |   | A | Addition of FR2 UL MIMO EVM measurement description<br>Note: The CR was not implementable and therefore was not implemented in the specification. | 17.8.0 |
| 2022-12 | RAN#98-e | RP-223309 | 1216 |   | F | CR correction to n100 and n101 UE to UE coexistence tables and revoval of brackets                                                                | 17.8.0 |
| 2022-12 | RAN#98-e | RP-223295 | 1218 | 1 | A | Addition of CA_n77-n78 to CA Band table R17                                                                                                       | 17.8.0 |
| 2022-12 | RAN#98-e | RP-223297 | 1220 |   | A | Correction to n91,n92,n93 and n94 co-ex R17                                                                                                       | 17.8.0 |
| 2022-12 | RAN#98-e | RP-223310 | 1223 |   | F | Definition of Window lengths for 35 and 45 MHz channel bandwidths                                                                                 | 17.8.0 |
| 2022-12 | RAN#98-e | RP-223296 | 1225 |   | A | CR for TS 38.101-1 Rel-17 CAT-A: Correcting critical error with co-existence for band CA_n8-n40                                                   | 17.8.0 |
| 2022-12 | RAN#98-e | RP-223291 | 1226 | 1 | F | CR for TS 38.101-1 Rel-17: Corrections on band combinations for UE co-existence                                                                   | 17.8.0 |
| 2022-12 | RAN#98-e | RP-223309 | 1230 |   | F | CR on NR-U A-MPR for PC5 VLP                                                                                                                      | 17.8.0 |
| 2022-12 | RAN#98-e | RP-223290 | 1233 |   | F | Rel17 Cat F CR Correct the DL configuration for harmonic MSD for CA_n12-n66 and CA_n25-n71                                                        | 17.8.0 |
| 2022-12 | RAN#98-e | RP-223481 | 1238 | 4 | A | Clarification of the CA_NS indication the values for n77 in the US [n77 US]                                                                       | 17.8.0 |
| 2022-12 | RAN#98-e | RP-223308 | 1242 |   | F | CR to R17 TS38.101-1 maintenance for UE co-ex requirements for UL CA                                                                              | 17.8.0 |
| 2022-12 | RAN#98-e | RP-223309 | 1245 | 2 | F | CR to 38.101-1: 4 Rx support for n104                                                                                                             | 17.8.0 |
| 2022-12 | RAN#98-e | RP-223311 | 1246 |   | F | Correction on the HigherPowerLimitCADC and powerClassPerBand IE                                                                                   | 17.8.0 |
| 2022-12 | RAN#98-e | RP-223298 | 1251 | 1 | F | CR for corrections on Rel-17 band combinations in TS38.101-1                                                                                      | 17.8.0 |
| 2022-12 | RAN#98-e | RP-223296 | 1253 |   | A | CR to 38.101-1 on removing ambiguity in CA MPR definition                                                                                         | 17.8.0 |
| 2022-12 | RAN#98-e | RP-223308 | 1254 |   | F | CR for 38.101-1: introduce UL MIMO configurations for band n40                                                                                    | 17.8.0 |
| 2022-12 | RAN#98-e | RP-223309 | 1262 | 1 | F | CR TS38.101-1 R17 Re-construct NR-U clause structure and introduce missing requirements                                                           | 17.8.0 |
| 2022-12 | RAN#98-e | RP-223291 | 1263 | 1 | F | CR TS38.101-1 R17 Corrections to Cross-band isolation and Rx harmonic mixing MSD                                                                  | 17.8.0 |
| 2022-12 | RAN#98-e | RP-223291 | 1267 |   | A | CR on 'Annex G Difference of relative phase and power errors' for FR1 UL coherent MIMO                                                            | 17.8.0 |
| 2022-12 | RAN#98-e | RP-223291 | 1270 |   | A | CR on TDD RMC for Intra-band EN-DC - TS 38.101-1                                                                                                  | 17.8.0 |
| 2022-12 | RAN#98-e | RP-223308 | 1273 | 1 | F | CR for 38.101-1 DMRS bundling with FR1 uplink CA                                                                                                  | 17.8.0 |
| 2022-12 | RAN#98-e | RP-223308 | 1275 |   | F | CR for 38.101-1: Corrections for 5 MHz for n41 and other errors                                                                                   | 17.8.0 |
| 2022-12 | RAN#98-e | RP-223308 | 1276 |   | F | CR for 38.101-1: NR CA table corrections                                                                                                          | 17.8.0 |
| 2022-12 | RAN#98-e | RP-223308 | 1278 |   | F | CR for updating the note of mandatory simultaneous Rx/Tx capability for FR1 NR-CA combinations                                                    | 17.8.0 |
| 2022-12 | RAN#98-e | RP-223308 | 1279 |   | F | CR for 38.101-1 for DC location R17 method                                                                                                        | 17.8.0 |
| 2023-03 | RAN#99   | RP-230519 | 1288 | 1 | F | CR TS 38.101-1: Correction on NR V2X requirements in Rel-17                                                                                       | 17.9.0 |
| 2023-03 | RAN#99   | RP-230501 | 1295 | 1 | F | CR for TS 38.101-1 Rel-17: Adding missing harmonic mixing MSD for CA_n25-n71                                                                      | 17.9.0 |
| 2023-03 | RAN#99   | RP-230517 | 1297 | 1 | F | TS 38.101-1 Rel-17 CAT-F: Correction to co-existence requirements of band n8 and n100                                                             | 17.9.0 |
| 2023-03 | RAN#99   | RP-230504 | 1299 |   | F | CR for TS 38.101-1 Rel-17 CAT-F: Corrections on band combinations for UE co-existence                                                             | 17.9.0 |
| 2023-03 | RAN#99   | RP-230519 | 1301 |   | F | CR for TS 38.101-1 Rel-17 CAT-F: Correction to NRU spectrum emission mask                                                                         | 17.9.0 |
| 2023-03 | RAN#99   | RP-230501 | 1304 |   | A | CR for TS 38.101-1 Rel-17: Correction for wrong reference in NS_50                                                                                | 17.9.0 |
| 2023-03 | RAN#99   | RP-230512 | 1312 |   | F | CR to 38.101-1: Correction of PC1 ACLR definition R17                                                                                             | 17.9.0 |
| 2023-03 | RAN#99   | RP-230544 | 1314 |   | F | NR CA corrections R17                                                                                                                             | 17.9.0 |
| 2023-03 | RAN#99   | RP-230513 | 1316 |   | F | CR 38.101-1 correction to A-MPR for NS_24 R17                                                                                                     | 17.9.0 |
| 2023-03 | RAN#99   | RP-230549 | 1319 |   | F | CR to 38.101-1: Corection to PC1 UTRA ACLR for bands n71 and n85.                                                                                 | 17.9.0 |
| 2023-03 | RAN#99   | RP-230502 | 1323 |   | A | Addition of configuration for carrier aggregation RMCs                                                                                            | 17.9.0 |
| 2023-03 | RAN#99   | RP-230519 | 1326 | 1 | F | CR to update NS_50 PC2 A-MPR                                                                                                                      | 17.9.0 |
| 2023-03 | RAN#99   | RP-230516 | 1327 | 1 | F | CR to introduce emissions specifications for certain LTE_V2X band combinations                                                                    | 17.9.0 |
| 2023-03 | RAN#99   | RP-230509 | 1337 | 1 | F | Clarification of the CA_NS indication and NS values for n77 in Canada [n77 Canada]                                                                | 17.9.0 |
| 2023-03 | RAN#99   | RP-230519 | 1340 |   | F | CR for 38.101-1 Corrections to the section 6.2D                                                                                                   | 17.9.0 |
| 2023-03 | RAN#99   | RP-230519 | 1343 |   | F | CR for TS 38.101-1, Correction of minor errors in suffix E (NR V2X/Sidelink) requirements                                                         | 17.9.0 |
| 2023-03 | RAN#99   | RP-230519 | 1347 |   | F | CR to 38.101-1: Corrections on A-MPR for CA_NC_NS_04                                                                                              | 17.9.0 |

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| 2023-03 | RAN#99  | RP-230519 | 1349 | 1 | F | Rel17 Cat F CR Introduce the missing P <sub>max</sub> tolerance requirement for PC2 intra-band NC UL CA         | 17.9.0  |
| 2023-03 | RAN#99  | RP-230519 | 1351 | 1 | F | Rel17 Cat F CR Add verification clarification for OOB emission and SE emission for intra-band NC UL CA          | 17.9.0  |
| 2023-03 | RAN#99  | RP-230502 | 1354 |   | A | Rel17 Cat A CR Correct the wrong table and clause that clause 6.2A.3.1.1 refer to                               | 17.9.0  |
| 2023-03 | RAN#99  | RP-230501 | 1361 |   | A | CR to add band n29 to blocking requirements                                                                     | 17.9.0  |
| 2023-03 | RAN#99  | RP-230507 | 1372 |   | F | Correct the scaling number for MPR/A-MPR and NS_04 SEM requirement                                              | 17.9.0  |
| 2023-03 | RAN#99  | RP-230519 | 1374 |   | F | Correct the P <sub>max</sub> for intra-band non-contiguous CA to support HPUE                                   | 17.9.0  |
| 2023-03 | RAN#99  | RP-230502 | 1380 |   | A | CR on Harmonic mixing MSD for CA n8A-n79A (R17 CAT-A)                                                           | 17.9.0  |
| 2023-03 | RAN#99  | RP-230514 | 1387 |   | F | Frequency range definition update for TS 38.101-1 (Rel-17)                                                      | 17.9.0  |
| 2023-03 | RAN#99  | RP-230519 | 1392 |   | F | Clarification on Time mask for Tx switching for SA (Rel-17)                                                     | 17.9.0  |
| 2023-03 | RAN#99  | RP-230503 | 1399 |   | A | CR for Rel-17 38.101-1 to correct the configurations for CA n46M/N/O                                            | 17.9.0  |
| 2023-03 | RAN#99  | RP-230513 | 1406 |   | F | CR for TS 38.101-1 to correct the delta MPR                                                                     | 17.9.0  |
| 2023-03 | RAN#99  | RP-230503 | 1410 |   | A | CR for TS 38.101-1 to clarify the inner outer condition for almost contiguous RB allocation (R17)               | 17.9.0  |
| 2023-03 | RAN#99  | RP-230501 | 1413 |   | A | CR for TS 38.101-1 to clarify band n34 protection for band n1 and n65 (R17)                                     | 17.9.0  |
| 2023-03 | RAN#99  | RP-230501 | 1416 |   | A | CR for TS 38.101-1 to clarify Out-of-band blocking exception for band n20 and n28 (R17)                         | 17.9.0  |
| 2023-03 | RAN#99  | RP-230517 | 1419 | 2 | F | CR on R17 TS38.101-1 Modification on the PC2 and PC1.5 note on the CA configuration with UL single carrier      | 17.9.0  |
| 2023-03 | RAN#99  | RP-230501 | 1426 |   | F | Additional maximum power reduction for NS_21 (Rel-17)                                                           | 17.9.0  |
| 2023-03 | RAN#99  | RP-230513 | 1429 |   | F | CR for 38.101-1: Band combination corrections                                                                   | 17.9.0  |
| 2023-03 | RAN#99  | RP-230519 | 1431 | 1 | F | CR for 38.101-1: Clarification of PC1.5 requirements                                                            | 17.9.0  |
| 2023-03 | RAN#99  | RP-230503 | 1435 |   | A | CR to TS 38.101-1 on humidity condition for normal temperature                                                  | 17.9.0  |
| 2023-03 | RAN#99  | RP-230516 | 1440 |   | F | CR for TS 38.101-1 on cleanups for V2X operating bands and channel bandwidth                                    | 17.9.0  |
| 2023-03 | RAN#99  | RP-230504 | 1458 |   | A | Output power for NS_38, NS_40, and NS_41                                                                        | 17.9.0  |
| 2023-03 | RAN#99  | RP-230504 | 1460 | 1 | F | CR to clarify duplex mode of SDL bands                                                                          | 17.9.0  |
| 2023-03 | RAN#99  | RP-230504 | 1465 | 1 | F | CR to TS 38.101-1 Rel-17 Minimum guardband and missing ULCA power class                                         | 17.9.0  |
| 2023-03 | RAN#99  | RP-230501 | 1470 |   | A | CR to TS 38.101-1 Rel-17 4Rx for SUL                                                                            | 17.9.0  |
| 2023-03 | RAN#99  | RP-230507 | 1474 | 1 | F | CR to return the Eq1 for intra-band UL CA contiguous                                                            | 17.9.0  |
| 2023-06 | RAN#100 | RP-231355 | 1483 |   | A | CR to K1 and PdschNumOfHargProcess for DL-CA                                                                    | 17.10.0 |
| 2023-06 | RAN#100 | RP-231356 | 1487 |   | F | FR1 OOB requirements correction                                                                                 | 17.10.0 |
| 2023-06 | RAN#100 | RP-231343 | 1500 |   | F | Update to UL-MIMO requirements (Rel-17)                                                                         | 17.10.0 |
| 2023-06 | RAN#100 | RP-231350 | 1503 | 2 | F | CR to correct the A-MPR table for NS_05/NS_05U                                                                  | 17.10.0 |
| 2023-06 | RAN#100 | RP-231348 | 1516 |   | F | CR for TS 38.101-1 to modify the errors in table 7.6.4-1 due to the introduction of equation-based method (R17) | 17.10.0 |
| 2023-06 | RAN#100 | RP-231343 | 1518 |   | F | CR for TS 38.101-1 to modify the errors for SUL_n78A-n80A configuration (R17)                                   | 17.10.0 |
| 2023-06 | RAN#100 | RP-231355 | 1530 |   | F | CR to TS38.101-1: Correction to out-of-band blocking table                                                      | 17.10.0 |
| 2023-06 | RAN#100 | RP-231349 | 1533 |   | F | NR interband 2UL CA co-ex simplification R17                                                                    | 17.10.0 |
| 2023-06 | RAN#100 | RP-231355 | 1542 |   | A | CR for TS 38.101-1 on corrections to the minimum guardband calculation (R17 CAT A)                              | 17.10.0 |
| 2023-06 | RAN#100 | RP-231351 | 1545 |   | A | Rel-17 CR to 38 101-1 for Clarification of UL Tx Switching                                                      | 17.10.0 |
| 2023-06 | RAN#100 | RP-231349 | 1547 | 1 | F | CR on MSD for shared spectrum band                                                                              | 17.10.0 |
| 2023-06 | RAN#100 | RP-231355 | 1548 |   | F | Rel17 Cat F CR for 38.101-1 Correct the MSD test configuration for CA_n18-n41                                   | 17.10.0 |
| 2023-06 | RAN#100 | RP-231387 | 1552 |   | F | CR to TS38.101-1: corrections on CA_n5-n28                                                                      | 17.10.0 |
| 2023-06 | RAN#100 | RP-231343 | 1553 |   | F | CR to TS38.101-1: Generalize the increase higher power limit requirements for current CA band combinations      | 17.10.0 |
| 2023-06 | RAN#100 | RP-231341 | 1556 |   | A | CR to TS38.101-1: Correction on terms for NR DC P <sub>max</sub>                                                | 17.10.0 |
| 2023-06 | RAN#100 | RP-231356 | 1568 |   | F | CR for Rel-17 38.101-1 to correct CA_n46N_BCS0 to CA_n46N_BCS1 for inter-band CA including CA_n46N              | 17.10.0 |
| 2023-06 | RAN#100 | RP-231349 | 1576 |   | F | CR to 38.101-1: add the missing additional spurious emissions for CA_n5B                                        | 17.10.0 |
| 2023-06 | RAN#100 | RP-231350 | 1580 |   | F | CR to TS38.101-1 on corrections for DMRS bundling with Tx Switching                                             | 17.10.0 |
| 2023-06 | RAN#100 | RP-231351 | 1587 |   | A | CR for TS 38.101-1: Adding missing requirements for NR-U Rel-17 CAT-A                                           | 17.10.0 |
| 2023-06 | RAN#100 | RP-231351 | 1589 |   | F | CR for TS 38.101-1: Adding missing requirements for NR-U Rel-17 CAT-F                                           | 17.10.0 |
| 2023-06 | RAN#100 | RP-231343 | 1594 |   | F | CR for 38.101-1: Single SUL CA combination notation modifications                                               | 17.10.0 |
| 2023-06 | RAN#100 | RP-231356 | 1598 |   | A | Update of FR1 UL MIMO EVM measurement description                                                               | 17.10.0 |
| 2023-06 | RAN#100 | RP-231356 | 1604 |   | A | CR to 38.101-1 Rel-17 Cat A, FRC correction                                                                     | 17.10.0 |
| 2023-06 | RAN#100 | RP-231349 | 1609 |   | F | CR to 38.101-1 Rel-17 Cat F, Missing MSD correction                                                             | 17.10.0 |
| 2023-06 | RAN#100 | RP-231343 | 1614 |   | F | CR to clarify DC location wording                                                                               | 17.10.0 |

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| 2023-06 | RAN#100 | RP-231338 | 1620 |   | F | CR to TS 38.101-1 (Rel-17): Alignment of PC2 uplink/downlink frequency locations to PC3 in configuration                                                                                                                                          | 17.10.0 |
| 2023-06 | RAN#100 | RP-231342 | 1623 |   | B | CR on PC2 for adding note to CA_n77C and CA_n78C                                                                                                                                                                                                  | 17.10.0 |
| 2023-06 | RAN#100 | RP-231338 | 1624 |   | F | CR to TS 38.101-1 (Rel-17): Correction of an invalid channel bandwidth in 3DL/2UL inter-band reference sensitivity testing for both PC3 and PC2                                                                                                   | 17.10.0 |
| 2023-06 | RAN#100 | RP-231350 | 1626 | 1 | F | DMRS bundling requirements correction                                                                                                                                                                                                             | 17.10.0 |
| 2023-09 | RAN#101 | RP-232505 | 1645 |   | F | CR to TS 38.101-1 Rel-17 Corrections to UE co-existence requirements                                                                                                                                                                              | 17.11.0 |
| 2023-09 | RAN#101 | RP-232505 | 1647 | 1 | F | CR to TS 38.101-1 Rel-17 Introduction of TDD uplink RMC for shorter transients                                                                                                                                                                    | 17.11.0 |
| 2023-09 | RAN#101 | RP-232505 | 1650 | 1 | F | CR to TS 38.101-1 Rel-17 SUL MSD alignment                                                                                                                                                                                                        | 17.11.0 |
| 2023-09 | RAN#101 | RP-232505 | 1652 | 1 | F | CR to TS 38.101-1 Rel-17 Corrections to cross-band MSD                                                                                                                                                                                            | 17.11.0 |
| 2023-09 | RAN#101 | RP-232505 | 1654 |   | F | CR to TS 38.101-1 Rel-17 Removing triple uplink configurations and corrections to 2ULCA REFSENS exceptions                                                                                                                                        | 17.11.0 |
| 2023-09 | RAN#101 | RP-232487 | 1658 |   | A | CR for TS 38.101-1 Rel-17 CAT-A: Introducing modification for NS_43 A-MPR region                                                                                                                                                                  | 17.11.0 |
| 2023-09 | RAN#101 | RP-232490 | 1661 |   | F | CR for TS 38.101-1 Rel-17 CAT-F: Adding missing channel bandwidth for NS_01                                                                                                                                                                       | 17.11.0 |
| 2023-09 | RAN#101 | RP-232504 | 1665 |   | A | CR to clarify pi2BPSK note                                                                                                                                                                                                                        | 17.11.0 |
| 2023-09 | RAN#101 | RP-232489 | 1670 |   | F | [NR_CADC_R16_2BDL_xBUL] Correction of a note number for CA_n77A-n78A (R17)                                                                                                                                                                        | 17.11.0 |
| 2023-09 | RAN#101 | RP-232500 | 1675 |   | F | [TEI17] CR 38.101-1: Various maintenance issues R17<br>NOTE: Partial CR Implementation:<br>Table 5.2A.2.2 changes were not implementable.<br>Table 6.5.2.4.2 changes were not based on the Rel-17 specification and could not be all implemented. | 17.11.0 |
| 2023-09 | RAN#101 | RP-232489 | 1684 |   | F | Correction of invalid channel bandwidth in configuration of 2DL/2UL inter-band harmonic mixing testing for PC3                                                                                                                                    | 17.11.0 |
| 2023-09 | RAN#101 | RP-232489 | 1686 |   | F | Correction of n48 channel bandwidth in configuration for PC3                                                                                                                                                                                      | 17.11.0 |
| 2023-09 | RAN#101 | RP-232489 | 1688 |   | F | Correction of invalid channel bandwidth in configuration of 2DL/2UL inter-band harmonic mixing testing for PC2                                                                                                                                    | 17.11.0 |
| 2023-09 | RAN#101 | RP-232487 | 1691 |   | A | CR for 38101-1: Almost contiguous NBC change reversal                                                                                                                                                                                             | 17.11.0 |
| 2023-09 | RAN#101 | RP-232498 | 1694 |   | A | CR for 38.101-1: CA_NS_27 and CA_NS_46 fix                                                                                                                                                                                                        | 17.11.0 |
| 2023-09 | RAN#101 | RP-232489 | 1703 | 2 | F | CR for missing MSD due to 4th order harmonic mixing requirements                                                                                                                                                                                  | 17.11.0 |
| 2023-09 | RAN#101 | RP-232505 | 1709 |   | A | CR to TS 38.101-1: correction of P <sub>cm</sub> tolerance for 2Tx (Rel-17)                                                                                                                                                                       | 17.11.0 |
| 2023-09 | RAN#101 | RP-232489 | 1715 |   | F | [NR_CADC_R17_2BDL_xBUL-Core] CR on MSD for shared spectrum band                                                                                                                                                                                   | 17.11.0 |
| 2023-09 | RAN#101 | RP-232486 | 1717 | 1 | F | [NR_6GHz-Core] CR to 38.101-1: applicability note for n104                                                                                                                                                                                        | 17.11.0 |
| 2023-09 | RAN#101 | RP-232489 | 1719 |   | F | [NR_DL1024QAM_FR1-Core] CR to 38.101-1: correction of FRC reference for maximum input level for 1024 QAM                                                                                                                                          | 17.11.0 |
| 2023-09 | RAN#101 | RP-232489 | 1725 |   | A | CR for TS 38.101-1 [NR_CADC_R16_3BDL_2BUL-Core] Removal of the constituent bands for the delta RIB values for inter-band CA configurations (R17_CAT_A)                                                                                            | 17.11.0 |
| 2023-09 | RAN#101 | RP-232498 | 1727 |   | D | [NR_RF_FR1_enh-Core] Editorial modification CR for TS 38.101-1                                                                                                                                                                                    | 17.11.0 |
| 2023-09 | RAN#101 | RP-232487 | 1729 |   | F | CR for Rel-17 38.101-1 to correct the superscript and some note for 2 bands inter-band CA related to simultaneous Rx/Tx.                                                                                                                          | 17.11.0 |
| 2023-09 | RAN#101 | RP-232502 | 1734 |   | A | [NR_newRAT-Core] Editorial modification CR for TS 38.101-1_V2                                                                                                                                                                                     | 17.11.0 |
| 2023-09 | RAN#101 | RP-232498 | 1737 | 1 | F | [NR_RF_FR1_enh] Supplementation of HPUE SAR schemes for Intra-band UL CA requirements                                                                                                                                                             | 17.11.0 |
| 2023-09 | RAN#101 | RP-232499 | 1742 |   | F | CR for correcting the SEM for intra-band contiguous CA operation                                                                                                                                                                                  | 17.11.0 |
| 2023-09 | RAN#101 | RP-232503 | 1749 |   | A | [NR_newRAT-Perf] CR: Correction of FRC for maximum input level for 256QAM                                                                                                                                                                         | 17.11.0 |
| 2023-09 | RAN#101 | RP-232489 | 1752 |   | A | [NR_CADC_R16_2BDL_xBUL-Core] CR to 38.101-1 R17 add the missing Tx requirement for CA_n25-n71                                                                                                                                                     | 17.11.0 |
| 2023-09 | RAN#101 | RP-232501 | 1757 |   | A | [NR_newRAT-Core] CR for TS 38.101-1 to modify MSD due to harmonic mixing interference (R17)                                                                                                                                                       | 17.11.0 |
| 2023-09 | RAN#101 | RP-232496 | 1759 | 1 | F | Rel17 Cat F CR for 38.101-1 Correct ?P <sub>PowerClass</sub> ,CA relevant requirement in clause 6.2A.1.3 for inter-band ULCA                                                                                                                      | 17.11.0 |
| 2023-09 | RAN#101 | RP-232486 | 1762 |   | A | [NR_6GHz_unlic_full] CR 38.101-1 correction to A-MPR requirements R17                                                                                                                                                                             | 17.11.0 |
| 2023-09 | RAN#101 | RP-232503 | 1767 |   | A | [NR_RF_FR1-Core] Editorial correction to 6.2A.4 (Rel-17)                                                                                                                                                                                          | 17.11.0 |
| 2023-09 | RAN#101 | RP-232488 | 1770 | 1 | F | [NR_cov_enh-Core] Update of FR1 DMRS bundling measurements                                                                                                                                                                                        | 17.11.0 |
| 2023-09 | RAN#101 | RP-232489 | 1776 |   | F | [NR_CADC_R17_2BDL_xBUL-Core] CR on TS38.101-1 Modification on MSD due to UL harmonic interference for CA_n48A-n66A                                                                                                                                | 17.11.0 |
| 2023-09 | RAN#101 | RP-232489 | 1778 |   | F | [NR_CADC_R17_2BDL_xBUL-Core] CR on R17 TS38.101-1 Remove the PC2 CA configuration                                                                                                                                                                 | 17.11.0 |
| 2023-09 | RAN#101 | RP-232501 | 1788 |   | A | [NR_newRAT-Core] Correction of intraband contiguous CA ACS requirements                                                                                                                                                                           | 17.11.0 |
| 2023-09 | RAN#101 | RP-232498 | 1791 |   | A | [NR_RF_FR1] Correction of intraband non-contiguous CA ACS requirements                                                                                                                                                                            | 17.11.0 |
| 2023-09 | RAN#101 | RP-232498 | 1793 |   | F | [NR_RF_FR1-Core] Correction to EVM measurement point for DFTs-OFDM DM-RS Type 2                                                                                                                                                                   | 17.11.0 |

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| 2023-09 | RAN#101 | RP-232498 | 1798 | 2 | F | [NR_RF_FR1-Core] CR for TS38101-1 Clarifying applicable power classes for NR CA<br>NOTE: Partial CR Implementation: Table 5.5A.3.4 changes were not implementable in the CR for NOTE 6. | 17.11.0 |
| 2023-09 | RAN#101 | RP-232489 | 1804 | 1 | F | Including of UL CA UetoUe co-ex R17                                                                                                                                                     | 17.11.0 |
| 2023-12 | RAN#102 | RP-233331 | 1814 |   | A | Fc terminology update                                                                                                                                                                   | 17.12.0 |
| 2023-12 | RAN#102 | RP-233340 | 1817 |   | A | CR for Intra-band UL CA MPR clarification                                                                                                                                               | 17.12.0 |
| 2023-12 | RAN#102 | RP-233348 | 1825 |   | F | CR for TS 38.101 Rel-17 correcting the starting RB location for NS 07                                                                                                                   | 17.12.0 |
| 2023-12 | RAN#102 | RP-233336 | 1831 |   | A | CR on TS38.101-1 for simplification of NR V2X UE coexistence in Rel-17 (Cat. A)                                                                                                         | 17.12.0 |
| 2023-12 | RAN#102 | RP-233351 | 1833 |   | F | [NR_RF_TxD-Core] Correction to 7.3G REFSSENS for TxD (Rel-17)                                                                                                                           | 17.12.0 |
| 2023-12 | RAN#102 | RP-233345 | 1841 |   | A | CR for 38.101-1 UE to UE coex R17                                                                                                                                                       | 17.12.0 |
| 2023-12 | RAN#102 | RP-233331 | 1854 |   | A | [NR_newRAT-Core] CR for TS 38.101-1 Rel-17: Introducing missing MSD for harmonic mixing                                                                                                 | 17.12.0 |
| 2023-12 | RAN#102 | RP-233348 | 1856 |   | F | CR to TS38.101-1 Rel-17 CAT-F: On harmonisation network signalling requirements                                                                                                         | 17.12.0 |
| 2023-12 | RAN#102 | RP-233349 | 1859 |   | F | CR to TS 38.101-1 (Rel-17): Correction of an Fc location for a 100MHz channel bandwidth of band n77                                                                                     | 17.12.0 |
| 2023-12 | RAN#102 | RP-233332 | 1874 |   | A | [NR_newRAT] CR for clarification on applicability of Rx antenna number for Rx requirements for TS 38.101-1                                                                              | 17.12.0 |
| 2023-12 | RAN#102 | RP-233339 | 1879 |   | A | Addition of 30 kHz SCS for Sync Raster for Band n53                                                                                                                                     | 17.12.0 |
| 2023-12 | RAN#102 | RP-233332 | 1882 |   | D | [NR_newRAT-Core] Editorial modification CR for TS 38.101-1                                                                                                                              | 17.12.0 |
| 2023-12 | RAN#102 | RP-233339 | 1885 |   | A | [NR_n41_BW-Core] Support of PC1.5 for n41 30MHz in Japan (R17)                                                                                                                          | 17.12.0 |
| 2023-12 | RAN#102 | RP-233339 | 1898 | 1 | F | [NR_n30-Core] CR to add resolution BW for Additional SEM for NS 21 - TS38.101-1, Rel-17, Cat-F                                                                                          | 17.12.0 |
| 2023-12 | RAN#102 | RP-233332 | 1902 |   | A | [NR_newRAT-Core] CR to remove the word "capable" in "power class 3 capable UE" - TS38.101-1, Rel-17, Cat-A                                                                              | 17.12.0 |
| 2023-12 | RAN#102 | RP-233340 | 1905 |   | A | [NR_RF_FR1-Core] CR concerning the RMS average used in EVM measurement with transient period - TS38.101-1, Rel-17, Cat-A                                                                | 17.12.0 |
| 2023-12 | RAN#102 | RP-233339 | 1912 |   | A | [NR_n38_BW2] Clarify A-MPR values for NS 44 - Rel17                                                                                                                                     | 17.12.0 |
| 2023-12 | RAN#102 | RP-233337 | 1916 |   | A | [NR_CADC_R16_2BDL_xBUL] CR for TS 38.101-1 to correct inter-band NR DC configuration table (R17 CAT A)                                                                                  | 17.12.0 |
| 2023-12 | RAN#102 | RP-233368 | 1920 |   | F | Rel17 Cat F CR for 38.101-1 Add missing Uplink configurations for PC3 CA_n46M-n48B-n96A and CA_n46M-n48(4A)-n96D                                                                        | 17.12.0 |
| 2023-12 | RAN#102 | RP-233368 | 1922 |   | F | Rel17 Cat F CR for 38.101-1 Add missing MSD due to UL harmonic interference for PC3 CA_n71-n78 in clause 7.3A.4                                                                         | 17.12.0 |
| 2023-12 | RAN#102 | RP-233332 | 1928 |   | A | [NR_newRAT-Core] CR for 38.101-1 to clarify the applicable bands for additional UTRA ACLR requirements. (R17)                                                                           | 17.12.0 |
| 2023-12 | RAN#102 | RP-233345 | 1930 |   | F | [NR_BCS4-Core] CR for 38.101-1 to modify the MSD value for CA_20-n78 harmonic mixing and NOTE2 in harmonic mixing table (R17)                                                           | 17.12.0 |
| 2023-12 | RAN#102 | RP-233345 | 1950 | 1 | F | [NR_CADC_R17_3BDL_2BUL-Core] CR for 38.101-1 to add missing IMD5 for CA_n48-n66-n70 with UL CA_n48-n66 (Rel-17, Cat. F)                                                                 | 17.12.0 |
| 2023-12 | RAN#102 | RP-233331 | 1958 |   | A | [NR_newRAT] CR to 38.101-1 on FRC correction                                                                                                                                            | 17.12.0 |
| 2023-12 | RAN#102 | RP-233331 | 1962 |   | A | [NR_newRAT] CR to 38.101-1 on FRC deletion for 5MHz 30 KHz                                                                                                                              | 17.12.0 |
| 2023-12 | RAN#102 | RP-233345 | 1965 |   | F | [NR_CADC_R17_2BDL_xBUL] CR to 38.101-1, n3-n77(2A) test point correction                                                                                                                | 17.12.0 |
| 2023-12 | RAN#102 | RP-233340 | 1971 |   | A | Correction of ?T_RxSRS for SRS resource set consisting of two SRS ports                                                                                                                 | 17.12.0 |
| 2023-12 | RAN#102 | RP-233332 | 1976 |   | A | CR to TS 38.101-1 Rel-17 Corrections to UE co-existence requirements                                                                                                                    | 17.12.0 |
| 2024-03 | RAN#103 | RP-240558 | 1990 |   | F | CR to 38.101-1 on correction of CA_n2A-n78A UL configuration                                                                                                                            | 17.13.0 |
| 2024-03 | RAN#103 | RP-240562 | 2003 |   | F | CR to TS 38.101-1 Rel-17 Corrections to UL configuration for asymmetric UL DL                                                                                                           | 17.13.0 |
| 2024-03 | RAN#103 | RP-240576 | 2010 |   | A | CR to TS38.101-1 Rel-17 CAT-A: On corrections for NR-U R16 A-MPR requirements                                                                                                           | 17.13.0 |
| 2024-03 | RAN#103 | RP-240557 | 2012 |   | F | CR to TS38.101-1 Rel-17 CAT-F: On corrections for NR-U R17 A-MPR requirements                                                                                                           | 17.13.0 |
| 2024-03 | RAN#103 | RP-240574 | 2017 |   | A | (NR_RF_FR1) Introduction of missing DMRS configuration restriction for intra-ULCA in FR1                                                                                                | 17.13.0 |
| 2024-03 | RAN#103 | RP-240552 | 2038 |   | F | (TEI17) CR for 38.101-1 corrections for UL CA configurations R17                                                                                                                        | 17.13.0 |
| 2024-03 | RAN#103 | RP-240552 | 2042 |   | A | (TEI16) almost contiguous A-MPR for PC2                                                                                                                                                 | 17.13.0 |
| 2024-03 | RAN#103 | RP-240558 | 2044 | 1 | F | (NR_CADC_R17_2BDL_xBUL-Core) Correction to MSD IMD test points                                                                                                                          | 17.13.0 |
| 2024-03 | RAN#103 | RP-240574 | 2047 |   | A | CA MPR correction                                                                                                                                                                       | 17.13.0 |
| 2024-03 | RAN#103 | RP-240557 | 2056 |   | F | CR to TS 38.101-1 (Rel-17): CR for removing n48(A-C) intra-band CA configuration                                                                                                        | 17.13.0 |
| 2024-03 | RAN#103 | RP-240558 | 2059 |   | F | (NR_CADC_R17_3BDL_2BUL) CR for TS 38.101-1 on inter-band CA for n46-n48-n96 (R17)                                                                                                       | 17.13.0 |
| 2024-03 | RAN#103 | RP-240566 | 2081 |   | F | (NR_newRAT-Core) Correct the equation in the NOTE for harmonic mixing MSD                                                                                                               | 17.13.0 |
| 2024-03 | RAN#103 | RP-240558 | 2095 |   | F | (NR_CADC_R17_2BDL_xBUL-Core) CR to correct carrier frequencies used in REFSSENS exceptions due to IMD for CA_n26-n70 - TS38.101-1, Rel-17, Cat-F                                        | 17.13.0 |

|         |          |           |      |   |   |                                                                                                                                                                                                    |         |
|---------|----------|-----------|------|---|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| 2024-03 | RAN#103  | RP-240561 | 2099 |   | F | (NR_n48-Core) CR to correct or add note applicable for specific channel bandwidths for CA including band n48 - TS38.101-1, Rel-17, Cat-F                                                           | 17.13.0 |
| 2024-03 | RAN#103  | RP-240574 | 2101 | 1 | F | (NR_RF_FR1_enh-Core) CR to add clarification regarding the configurations of the UL CCs for suffix H - TS38.101-1, Rel-17, Cat-F                                                                   | 17.13.0 |
| 2024-03 | RAN#103  | RP-240565 | 2105 | 1 | F | (NR_newRAT-Core) CR to correct "Supplement" to "Supplementary" in the definition of the suffix used for SUL - TS38.101-1, Rel-17, Cat-F                                                            | 17.13.0 |
| 2024-03 | RAN#103  | RP-240557 | 2114 |   | F | (NR_CA_R17_3BDL_1BUL-Core) CR for TS 38.101-1 to add missing combo CA_n3A-n8A-n79A (R17)                                                                                                           | 17.13.0 |
| 2024-03 | RAN#103  | RP-240564 | 2118 |   | A | (NR_newRAT-Core) CR for TS 38.101-1 to correct the Finterferer (offset) for intra-band CA ACS and IBB requirements (R17)                                                                           | 17.13.0 |
| 2024-03 | RAN#103  | RP-240558 | 2120 |   | F | (NR_CADC_R17_2BDL_xBUL-Core) CR for TS 38.101-1 to clarify the applicable SCS when UE testing (R17)                                                                                                | 17.13.0 |
| 2024-03 | RAN#103  | RP-240552 | 2126 |   | B | Minimum requirements for uplink TX switching with dual TAG [UL TX switching]                                                                                                                       | 17.13.0 |
| 2024-03 | RAN#103  | RP-240574 | 2142 |   | A | (NR_RF_FR1) CR to TS 38.101-1: Channel raster to resource element mapping                                                                                                                          | 17.13.0 |
| 2024-03 | RAN#103  | RP-240564 | 2149 |   | A | (NR_newRAT-Core) CR to remove the word capable in power class related requirements                                                                                                                 | 17.13.0 |
| 2024-03 | RAN#103  | RP-240564 | 2153 |   | A | (NR_newRAT-Core) CR to TS38.101-1: Correction of band number in uplink configuration for reference sensitivity table                                                                               | 17.13.0 |
| 2024-03 | RAN#103  | RP-240572 | 2163 | 1 | F | Compensating for post antenna connector gain impact to unwanted emissions for n101 band                                                                                                            | 17.13.0 |
| 2024-03 | RAN#103  | RP-240558 | 2166 |   | F | [NR_CADC_R17_2BDL_xBUL] CR for 38.101-1: Correct missing CA_n71-n77 Harmonic                                                                                                                       | 17.13.0 |
| 2024-03 | RAN#103  | RP-240557 | 2169 |   | C | [NR_BCS4-Core] CR for 38.101-1: Maximum Aggregated BW for BCS5                                                                                                                                     | 17.13.0 |
| 2024-03 | RAN#103  | RP-240576 | 2171 | 1 | F | (NR_unlic-Core) Correction CR for NS_59 in TS38.101-1                                                                                                                                              | 17.13.0 |
| 2024-06 | RAN4#104 | RP-241382 | 2202 |   | F | CR to fix CBW listing of NS_37 emission requirements                                                                                                                                               | 17.14.0 |
| 2024-06 | RAN4#104 | RP-241394 | 2204 |   | F | CR to 38.101-1 on Wgap correction for CA_n2(2A) REFSSENS requirement                                                                                                                               | 17.14.0 |
| 2024-06 | RAN4#104 | RP-241393 | 2213 |   | A | CR to align NR carrier centre frequencies with LTE for NS_24                                                                                                                                       | 17.14.0 |
| 2024-06 | RAN4#104 | RP-241393 | 2225 |   | F | CR for TS 38.101-1 Rel-17 correcting maximum transmission bandwidth for NS_04                                                                                                                      | 17.14.0 |
| 2024-06 | RAN4#104 | RP-241388 | 2233 | 1 | F | R18 Cat-F CR 38.101-1 correction CR for Rx requirements with TxD indication<br>NOTE: The changes related to clause 7.3A.4 was not implemented as it was not based on current Rel-17 specification. | 17.14.0 |
| 2024-06 | RAN4#104 | RP-241402 | 2258 |   | F | (NR_RF_FR1_enh-Core) CR to 38.101-1 R17 corrections on Pcmx tolerance for intra-band contiguous CA with UL MIMO                                                                                    | 17.14.0 |
| 2024-06 | RAN4#104 | RP-241382 | 2260 |   | F | CR for Rel-17 to correct the signalling IE for FR1 Intra-band non-contiguous CA in clause 6.2A.2.2.0.                                                                                              | 17.14.0 |
| 2024-06 | RAN4#104 | RP-241395 | 2267 |   | F | CR on MSD value correction for power class 5 cross band isolation                                                                                                                                  | 17.14.0 |
| 2024-06 | RAN4#104 | RP-241391 | 2269 |   | A | (LTE_NR_DC_CA_enh) CR to TS 38.101-1: correction of Pcmx tolerance for NR DC (Rel-17)                                                                                                              | 17.14.0 |
| 2024-06 | RAN4#104 | RP-241389 | 2272 |   | F | (5G_V2X_NRSL) CR to TS 38.101-1: correction of Pcmx tolerance for sidelink (Rel-17)                                                                                                                | 17.14.0 |
| 2024-06 | RAN4#104 | RP-241402 | 2278 |   | F | (NR_RF_FR1_enh-Core) CR to add clarification regarding the configurations of the UL CCs for suffix H - TS38.101-1, Rel-17, Cat-F                                                                   | 17.14.0 |
| 2024-06 | RAN4#104 | RP-241394 | 2280 | 1 | F | (NR_CA_R16_intra-Core, ) CR to add notes for SCS restrictions on CBWs in CA configurations - TS38.101-1, Rel-17                                                                                    | 17.14.0 |
| 2024-06 | RAN4#104 | RP-241395 | 2282 |   | F | (NR_CADC_R17_3BDL_2BUL) CR to correct n66 transmission bandwidth used in REFSSENS exceptions due to IMD5 for CA_n5-n48-n66 - TS38.101-1, Rel-17                                                    | 17.14.0 |
| 2024-06 | RAN4#104 | RP-241383 | 2286 |   | F | (NR_newRAT-Core) Correct the Pcmx tolerance for inter-band CA and TxD                                                                                                                              | 17.14.0 |
| 2024-06 | RAN4#104 | RP-241492 | 2292 |   | A | Cat A CR to TS 38.101-1 Rel-17 NR-U Nominal channel spacing                                                                                                                                        | 17.14.0 |
| 2024-06 | RAN4#104 | RP-241402 | 2312 | 1 | F | (NR_RF_FR1_enh-Core) CR for TS 38.101-1: Add ACLR requirement for PC2 intra-band non-contiguous UL CA                                                                                              | 17.14.0 |
| 2024-06 | RAN4#104 | RP-241402 | 2314 | 1 | F | (NR_RF_FR1_enh-Core) CR for TS 38.101-1: Corrections on intra-band UL contiguous CA with UL MIMO for PC3                                                                                           | 17.14.0 |
| 2024-06 | RAN4#104 | RP-241402 | 2319 |   | A | [NR_RF_FR1-Core] CR to TS 38.101-1: Almost contiguous RB allocations                                                                                                                               | 17.14.0 |
| 2024-06 | RAN4#104 | RP-241395 | 2328 |   | F | Adding missing MSD for CA_n2A-n66A and for CA_n25A-n66A PC3                                                                                                                                        | 17.14.0 |
| 2024-06 | RAN4#104 | RP-241395 | 2330 |   | F | (NR_CADC_R17_3BDL_2BUL) CR to 38.101-1: Adding note to CA_n7-n8-n78 for IMD4                                                                                                                       | 17.14.0 |
| 2024-06 | RAN4#104 | RP-241382 | 2347 |   | A | (NR_newRAT-Core) CR for TS 38.101-1 on UE additional spurious emissions (R17_CAT_A)                                                                                                                | 17.14.0 |
| 2024-06 | RAN4#104 | RP-241398 | 2350 | 1 | F | CR to TS 38.101-1: Clarification on band-specific post antenna gain values for the FRMCS operation                                                                                                 | 17.14.0 |
| 2024-06 | RAN4#104 | RP-241398 | 2352 | 1 | F | CR to TS 38.104: clarifications on RMR terminology and related operating bands                                                                                                                     | 17.14.0 |
| 2024-06 | RAN4#104 | RP-241388 | 2366 |   | F | Rel-17 SUL configuration correction for REFSSENS for DL in n24 and UL in n99                                                                                                                       | 17.14.0 |
| 2024-09 | RAN#105  | RP-242156 | 2373 |   | F | CR to R17 38.101-1 to add 25MHz CBW to NS_18 emissions requirement                                                                                                                                 | 17.15.0 |
| 2024-09 | RAN#105  | RP-242183 | 2378 |   | F | (NR_PC2_CA_R17_2BDL_2BUL-Core) CR for 38.101-1 to add general text descriptions on higher power class(es) applicability for higher order band combinations                                         | 17.15.0 |

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| 2024-09 | RAN#105 | RP-242158 | 2386 | 1 | F | (NR_CADC_R17_2BDL_xBUL) Removal of CA combinations containing n48(A-C)                                                                                                             | 17.15.0 |
| 2024-09 | RAN#105 | RP-242173 | 2390 |   | A | CR for TS 38.101-1 Rel-17 correction on the terminology of emission bandwidth for NS_04                                                                                            | 17.15.0 |
| 2024-09 | RAN#105 | RP-242184 | 2393 | 1 | F | (NR_redcap-Core) Correction of the channel raster for RedCap UEs by added entries                                                                                                  | 17.15.0 |
| 2024-09 | RAN#105 | RP-242155 | 2398 | 1 | F | (NR_6GHz_unlic_EU-Core) CR for TS 38.101-1 on UE transmitter power for the P <sub>max</sub> tolerance for NR unlicensed operation (R17)                                            | 17.15.0 |
| 2024-09 | RAN#105 | RP-242158 | 2400 | 1 | F | (NR_CADC_R17_3BDL_2BUL-Core) CR for TS 38.101-1 on UE configured power relaxation for special component bands (R17)                                                                | 17.15.0 |
| 2024-09 | RAN#105 | RP-242157 | 2406 |   | F | CR on 38.101-1 Remove the superscript NOTE 1 for intra-band contiguous CA                                                                                                          | 17.15.0 |
| 2024-09 | RAN#105 | RP-242174 | 2409 |   | A | (NR_n28_BW-Core) Apply ?MPR to the total MOP reduction                                                                                                                             | 17.15.0 |
| 2024-09 | RAN#105 | RP-242183 | 2411 | 1 | F | (NR_PC2_CA_R17_2BDL_2BUL) Remove superscript NOTE 6 for PC2 TDD-TDD inter-band CA                                                                                                  | 17.15.0 |
| 2024-09 | RAN#105 | RP-242190 | 2417 |   | A | CR on typo for A-MPR of NR unlicensed band                                                                                                                                         | 17.15.0 |
| 2024-09 | RAN#105 | RP-242158 | 2430 |   | F | CR on MSD value correction for power class 5 cross band isolation                                                                                                                  | 17.15.0 |
| 2024-09 | RAN#105 | RP-242174 | 2435 |   | A | (NR_newRAT-core) CR for TS 38.101-1 R17 correction on AMPR for NS_10                                                                                                               | 17.15.0 |
| 2024-09 | RAN#105 | RP-242149 | 2441 |   | A | (5G_V2X_NRSL-Core) CR to correct the name of the feature "V2X con-current operation" to "V2X concurrent operation" - TS38.101-1                                                    | 17.15.0 |
| 2024-09 | RAN#105 | RP-242191 | 2446 |   | A | (TEI16) CR to correct (typo) of the definitions of the symbols N <sub>rb_agg</sub> - TS38.101-1                                                                                    | 17.15.0 |
| 2024-09 | RAN#105 | RP-242186 | 2451 | 1 | A | Correction for value B for non-contiguous uplink carrier aggregation                                                                                                               | 17.15.0 |
| 2024-09 | RAN#105 | RP-242189 | 2462 | 1 | F | (NR_SUL_combos_R17-Core) CR for TS 38.101-1 to clarify the applicability for NUL carriers (R17)                                                                                    | 17.15.0 |
| 2024-09 | RAN#105 | RP-242191 | 2469 |   | F | Cat F CR to TS 38.101-1 Rel-17 REFSENS Corrections                                                                                                                                 | 17.15.0 |
| 2024-09 | RAN#105 | RP-242191 | 2475 |   | A | Cat A CR to TS 38.101-1 Rel-17 Power Class 4 clean-up                                                                                                                              | 17.15.0 |
| 2024-09 | RAN#105 | RP-242171 | 2480 |   | A | (NR_n41_BW-Core) CR to TS 38.101-1: NS_47 correction                                                                                                                               | 17.15.0 |
| 2024-09 | RAN#105 | RP-242191 | 2488 |   | A | (TEI) On missing BCS set definition for asymmetric TDD                                                                                                                             | 17.15.0 |
| 2024-09 | RAN#105 | RP-242171 | 2495 |   | A | (NR_n14-Core, TEI16) Correction of notes for UE output power                                                                                                                       | 17.15.0 |
| 2024-09 | RAN#105 | RP-242173 | 2502 | 1 | F | CR to 38.101-1 Rel-17: Corrections of NR operating bands clause in FR1                                                                                                             | 17.15.0 |
| 2024-12 | RAN#106 | RP-243054 | 2514 | 1 | A | (NR_newRAT-Core) Replacement of dual with 2Tx                                                                                                                                      | 17.16.0 |
| 2024-12 | RAN#106 | RP-243040 | 2522 |   | A | (NR_eMIMO) Clarification of Rel-15 pi2BPSK variant in wording in 38.101-1 Rel-17                                                                                                   | 17.16.0 |
| 2024-12 | RAN#106 | RP-243023 | 2525 | 1 | A | (5G_V2X_NRSL-Core) CR to 38.101-1 Rel-17 Cat-A for 7.6E.3.1 Out-of-band blocking for V2X non-concurrent operation                                                                  | 17.16.0 |
| 2024-12 | RAN#106 | RP-243052 | 2527 |   | F | (NR_n30-Core) n30 NS_21 AMPR correction CR to 38.101-1                                                                                                                             | 17.16.0 |
| 2024-12 | RAN#106 | RP-243054 | 2531 | 1 | F | (NR_newRAT-Core) Correction to IBB for intraband contiguous CA                                                                                                                     | 17.16.0 |
| 2024-12 | RAN#106 | RP-243063 | 2538 |   | D | (NR_RF_FR1_enh-Core) CR on typo for carrier leakage of intra-band NC CA (R17)                                                                                                      | 17.16.0 |
| 2024-12 | RAN#106 | RP-243035 | 2553 |   | F | (NR_CADC_R17_2BDL_xBUL-Core) CR on 38.101-1 [R17] Some corrections on the MSD table                                                                                                | 17.16.0 |
| 2024-12 | RAN#106 | RP-243063 | 2558 |   | A | (NR_RF_FR1) Update the ACLR description for intra-band NC CA                                                                                                                       | 17.16.0 |
| 2024-12 | RAN#106 | RP-243054 | 2560 |   | F | (NR_newRAT-Core) CR to TS38.101-1: Correction on applicability of minimum requirements                                                                                             | 17.16.0 |
| 2024-12 | RAN#106 | RP-243052 | 2573 | 1 | A | CR on n28 30MHz channel confinement                                                                                                                                                | 17.16.0 |
| 2024-12 | RAN#106 | RP-243054 | 2579 |   | A | (NR_newRAT-Core) CR to modify MBW definition - TS38.101-1                                                                                                                          | 17.16.0 |
| 2024-12 | RAN#106 | RP-243067 | 2581 |   | F | (NR_newRAT-Core, TEI17) CR to correct the note 1 indication from NS_05 to NS_05U - TS38.101-1                                                                                      | 17.16.0 |
| 2024-12 | RAN#106 | RP-243052 | 2584 |   | A | (NR_n53-Core) CR to correct Note 6 of Table 7.6.3-2 regarding band n53 OOB - TS38.101-1                                                                                            | 17.16.0 |
| 2024-12 | RAN#106 | RP-243023 | 2593 | 1 | F | CR to TS 38.101-1: DL CA HPUE                                                                                                                                                      | 17.16.0 |
| 2025-03 | RAN#107 | RP-250596 | 2623 |   | F | (NR_RF_TxD-Core) Replacement of dual Tx with 2Tx and single Tx with 1Tx<br>NOTE: The CR is not based on latest spec. Not implemented.                                              | 17.17.0 |
| 2025-03 | RAN#107 | RP-250597 | 2692 |   | F | (NR_SL_enh-Core) CR on A-MPR for NS_33 (R17)                                                                                                                                       | 17.17.0 |
| 2025-03 | RAN#107 | RP-250581 | 2696 |   | A | (5G_V2X_NRSL-Core) CR on SL MIMO configuration (R17)                                                                                                                               | 17.17.0 |
| 2025-06 | RAN#108 | RP-250918 | 2731 |   | F | (NR_CADC_R17_3BDL_2BUL-Core) CR to 38.101-1: Correction on CA_n28-n40-n78 (Rel-17)                                                                                                 | 17.18.0 |
| 2025-06 | RAN#108 | RP-250919 | 2738 |   | F | (NR_RAIL_EU_900MHz-Core, NR_RAIL_EU_1900MHz_TDD-Core) CR to TS 38.101-1: Correction to mapping of network signalling table (Rel-17)                                                | 17.18.0 |
| 2025-06 | RAN#108 | RP-250918 | 2749 |   | F | (NR_CADC_R17_2BDL_xBUL) CR to clarify that sources of IMD coming from two CCs in clause 7.3A.5 can be from two bands or just a single band - TS38.101-1                            | 17.18.0 |
| 2025-06 | RAN#108 | RP-250918 | 2754 |   | F | (NR_CADC_R17_2BDL_xBUL-Core) CR to clarify the applicable SCS when UE testing in clause 7.3A.1 - TS 38.101-1                                                                       | 17.18.0 |
| 2025-06 | RAN#108 | RP-250918 | 2757 |   | F | (NR_CADC_R17_2BDL_xBUL-Core) CR to correct Band n40 DL F <sub>c</sub> used in the configuration for CA_n40-n77 cross band isolation MSD requirements in clause 7.3A.6 - TS38.101-1 | 17.18.0 |



History

| Version  | Date          | Status      |
|----------|---------------|-------------|
| V17.5.0  | May 2022      | Publication |
| V17.6.0  | August 2022   | Publication |
| V17.7.0  | October 2022  | Publication |
| V17.8.0  | January 2023  | Publication |
| V17.9.0  | May 2023      | Publication |
| V17.10.0 | July 2023     | Publication |
| V17.11.0 | October 2023  | Publication |
| V17.12.0 | February 2024 | Publication |
| V17.13.0 | June 2024     | Publication |
| V17.14.0 | August 2024   | Publication |
| V17.15.0 | November 2024 | Publication |
| V17.16.0 | February 2025 | Publication |
| V17.17.0 | April 2025    | Publication |
| V17.18.0 | July 2025     | Publication |