

ETSI TS 138 101-3 V15.24.0 (2024-02)



**5G;  
NR;  
User Equipment (UE) radio transmission and reception;  
Part 3: Range 1 and Range 2 Interworking operation  
with other radios  
(3GPP TS 38.101-3 version 15.24.0 Release 15)**



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Reference

RTS/TSGR-0438101-3vfo0

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Keywords

5G

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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.

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# 1 Scope

The present document establishes the minimum RF requirements for NR User Equipment (UE) Interworking operation with other radios. This includes but is not limited to additional requirements for carrier aggregation or NR dual connectivity between Range 1 and Range 2 and additional requirements due to NR non-standalone (NSA) operation mode with E-UTRA.

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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 38.101-1: "NR; User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone"
- [3] 3GPP TS 38.101-2: "NR; User Equipment (UE) radio transmission and reception; Part 2: Range 2 Standalone"
- [4] 3GPP TS 36.101: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception"
- [5] 3GPP TS 38.521-3: "NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 3: Range 1 and Range 2 Interworking operation with other radios"
- [6] Recommendation ITU-R M.1545: "Measurement uncertainty as it applies to test limits for the terrestrial component of International Mobile Telecommunications-2000"
- [7] 3GPP TS 36.211: "E-UTRA; Physical channels and modulation"
- [8] 3GPP TS 36.331: " Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC); Protocol specification"
- [9] 3GPP TS 38.331: "NR; Radio Resource Control (RRC) protocol specification"
- [10] 3GPP TS 38.213: "NR; Physical layer procedures for control"
- [11] 3GPP TS 38.306: "NR; User Equipment (UE) radio access capabilities"
- [12] 3GPP TS 38.133: "NR; Requirements for support of radio resource management".
- [13] 3GPP TS 38.211: "NR; Physical channels and modulation".

## 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].

### 3.2 Symbols

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

|                            |  |
|----------------------------|--|
| $\Delta R_{IB,c}$          | Allowed reference sensitivity relaxation due to support for CA or DC operation, for serving cell $c$ .   |
| $\Delta T_{IB,c}$          | Allowed maximum configured output power relaxation due to support for CA or DC operation, for serving cell $c$   |
| $BW_{E-UTRA\_Channel}$     | Channel bandwidth of E-UTRA carrier  |
| $BW_{E-UTRA\_Channel\_CA}$ | Channel bandwidth of E-UTRA sub-block which is composed of intra-band contiguous CA E-UTRA carriers  |
| $BW_{NR\_Channel}$         | Channel bandwidth of NR carrier  |
| $BW_{NR\_Channel\_CA}$     | Channel bandwidth of NR sub-block which is composed of intra-band contiguous CA NR carriers  |
| $Ceil(x)$                  | Rounding upwards; $ceil(x)$ is the smallest integer such that $ceil(x) \geq x$   |
| $EN-DC_{ACLR}$             | The ratio of the filtered mean power centred on the aggregated sub-block bandwidth ENBW to the filtered mean power centred on an adjacent bandwidth of the same size ENBW                                  |
| $E-UTRA_{ACLR}$            | E-UTRA ACLR  |
| $F_C$                      | <i>RF reference frequency</i> for the carrier center on the channel raster   |
| $F_{DL\_low}$              | The lowest frequency of the downlink <i>operating band</i>   |
| $F_{DL\_high}$             | The highest frequency of the downlink <i>operating band</i>  |
| $F_{UL\_low}$              | The lowest frequency of the uplink <i>operating band</i>   |
| $F_{UL\_high}$             | The highest frequency of the uplink <i>operating band</i>  |
| $F_{OOB}$                  | The boundary between the NR out of band emission and spurious emission domains   |
| $L_{CRB}$                  | Transmission bandwidth which represents the length of a contiguous resource block allocation expressed in units of resource blocks   |
| $Max()$                    | The largest of given numbers   |
| $Min()$                    | The smallest of given numbers  |
| $NR_{ACLR}$                | NR ACLR  |
| $N_{RB}$                   | Transmission bandwidth configuration, expressed in units of resource blocks  |
| $N_{RB\_agg}$              | The number of the aggregated RBs within the fully allocated aggregated channel bandwidth<br>$N_{RB\_agg} = \sum_1^j N_{RB_j} * 2^{\mu_j}$ for carrier 1 to $j$ , where $\mu$ is defined in TS 38.211 [13]  |
| $N_{RB,c}$                 | The transmission bandwidth configuration of component carrier $c$ , expressed in units of resource blocks<br>$N_{RB,cj} = N_{RB_j} * 2^{\mu_j}$ for carrier $j$ , where $\mu$ is defined in TS 38.211 [13] |
| $P_{CMAX}$                 | The configured maximum UE output power   |
| $RB_{start}$               | Indicates the lowest RB index of transmitted resource blocks   |
| $W_{gap}$                  | The sub-block gap between the two sub-blocks   |

### 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 |
| BCS   | Bandwidth Combination Set          |
| CA    | Carrier Aggregation                |

|         |   |
|---------|---|
| CC      | Component Carrier   |
| DC      | Dual Connectivity   |
| EN-DC   | E-UTRA/NR DC  |
| EVM     | Error Vector Magnitude  |
| FDM     | Frequency Division Multiplexing   |
| FR      | Frequency Range   |
| ENBW    | The aggregated bandwidth of an E-UTRA sub-block and an adjacent NR sub-block                          |
| ITU-R   | Radiocommunication Sector of the International Telecommunication Union                                |
| MBW     | Measurement bandwidth defined for the protected band  |
| MPR     | Allowed maximum power reduction   |
| MSD     | Maximum Sensitivity Degradation   |
| MCG     | Master Cell Group   |
| NR      | New Radio   |
| NS      | Network Signalling  |
| NSA     | Non-Standalone, a mode of operation where operation of an other radio is assisted with an other radio |
| OOB     | Out-of-band   |
| OOBE    | Out-of-band emission  |
| OTA     | Over The Air  |
| PRB     | Physical Resource Block   |
| RE      | Resource Element  |
| REFSENS | Reference Sensitivity   |
| RF      | Radio Frequency   |
| Rx      | Receiver  |
| SCG     | Secondary Cell Group  |
| SCS     | Subcarrier spacing  |
| SEM     | Spectrum Emission Mask  |
| SUL     | Supplementary uplink  |
| TDM     | Time Division Multiplex   |
| Tx      | Transmitter   |
| UE      | User Equipment  |
| UL MIMO | Up Link Multiple Antenna transmission   |
| ULSUP   | Uplink sharing from UE perspective  |

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## 4 General

### 4.1 Relationship between minimum requirements and test requirements

The present document is interwork 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 38.521-3 [5].

The Minimum Requirements given in this specification make no allowance for measurement uncertainty. The test specification TS 38.521-3 [5] 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 [6].

### 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) Terminal that supports EN-DC configuration shall meet E-UTRA requirements as specified in TS 36.101 [4] and NR requirements as in TS 38.101-1 [2] and TS 38.101-2 [3] unless otherwise specified in this specification
- e) All the requirements for intra-band contiguous and non-contiguous EN-DC apply under the assumption of the same uplink-downlink and special subframe configurations in the E-UTRA and slot format indicated by UL-DL-configurationCommon and UL-DL-configurationDedicated in the NR for the EN-DC, a time offset between the two RATs configurations may be required.
- f) For EN-DC combinations with CA configurations for E-UTRA and/or NR, all the requirements for E-UTRA and/or NR all the requirements for E-UTRA and/or NR intra-band contiguous and non-contiguous CA apply under the assumption of the same slot format indicated by UL-DL-configurationCommon and UL-DL-configurationDedicated in the PSCell and SCells for NR and the same uplink-downlink and special subframe configurations in Pcell and SCells for E-UTRA.

A terminal which supports an EN-DC configuration shall support:

If any subsets of the EN-DC configuration do not specify its own bandwidth combination sets in 5.3B, then the terminal shall support the same E-UTRA bandwidth combination sets it signals the support for in E-UTRA CA configuration part of E-UTRA – NR DC and shall support the same NR bandwidth combination sets it signals the support for in NR CA configuration part of E-UTRA – NR DC.

Else if one of the subsets of the EN-DC configuration specify its own bandwidth combination sets in 5.3B, then the terminal shall support a product set of channel bandwidth for each band specified by E-UTRA bandwidth combination sets, NR bandwidth combination sets, and EN-DC bandwidth combination sets it signals the support.

A terminal which supports an inter-band EN-DC configuration with a certain UL configuration shall support the all lower order DL configurations of the lower order EN-DC combinations, which have this certain UL configuration and the fallbacks of this UL configuration.

For CA or DC configurations, which include FR2 intra-band CA configurations with multiple FR2 sub-blocks, where at least one of the sub-blocks is a contiguous CA configuration:

- if the field *partialFR2-FallbackRX-Req* is not present, the UE shall meet all applicable UE RF requirements for the highest order CA configuration and all associated fallback CA configurations;
- if the field *partialFR2-FallbackRX-Req* is present, for each FR2 intra-band CA configuration with multiple sub-blocks that the UE indicates support for explicitly in UE capability signalling: the in-gap UE RF requirements in clauses 7.5A, 7.5B, 7.6A, 7.6B apply as the equivalent requirements for the associated fallback FR2 intra-band CA configurations with the same number of sub-blocks, where at least one of the sub-blocks consists of a contiguous CA configuration. The UE shall meet all applicable UE RF requirements for fallback CA configurations with a lesser number of sub-blocks;
- regardless of the field *partialFR2-FallbackRX-Req*, the UE shall meet all DL out-of-gap requirements for all lower order fallback CA configurations.

Terminal that supports inter-band NR-DC between FR1 and FR2 configuration shall meet the requirements for corresponding CA configuration (suffix A), unless otherwise specified.

## 4.3 Specification suffix information

Unless stated otherwise the following suffixes are used for indicating at 2<sup>nd</sup> level clause, shown in Table 4.3-1.

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

| Clause suffix | Variant        |
|---------------|----------------|
| None          | Single Carrier |

|   |  |
|---|--|
| A | Carrier Aggregation (CA) between FR1 and FR2   |
| B | Dual-Connectivity (DC) with and without SUL including UL sharing from UE perspective, inter-band NR DC between FR1 and FR2 |
| D | 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 specifications are identified as described in Table 5.1-1.

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

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

The present specification covers band combinations including

- at least one FR1 operating band and one FR2 operating band for carrier aggregation and dual connectivity operations;
- at least one E-UTRA operating band for dual connectivity operations.

### 5.2 Operating bands

NR is designed to operate in FR1 operating bands defined in TS 38.101-1 [2] and FR2 operating bands defined in TS 38.101-2 [3]. E-UTRA is designed to operate in operating bands defined in TS 36.101 [4].

#### 5.2A Operating bands for CA

##### 5.2A.1 Inter-band CA between FR1 and FR2

NR carrier aggregation are designed to operate in the operating bands defined in Table 5.2A.1-1. The band combinations include at least one FR1 operating band and one FR2 operating band.

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.1-1: Band combinations for inter-band NR CA between FR1 and FR2**

| NR CA Band  | NR Band   |
|---|-----------|
| CA_n8-n258 <sup>1</sup>   | n8, n258  |
| CA_n71-n257 <sup>1</sup>  | n71, n257 |
| CA_n77-n257 <sup>1</sup>  | n77, n257 |
| CA_n78-n257 <sup>1</sup>  | n78, n257 |
| CA_n79-n257 <sup>1</sup>  | n79, n257 |
| NOTE 1: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability. |           |

## 5.2B Operating bands for DC

### 5.2B.1 General

The operating bands are specified in clause 5.5B for operation with EN-DC, NGEN-DC, NE-DC or NR-DC configured.

5.2B.2 Void

5.2B.3 Void

5.2B.4 Void

5.2B.5 Void

5.2B.6 Void

5.2B.7 Void

## 5.3 UE Channel bandwidth

### 5.3A UE Channel bandwidth for CA

#### 5.3A.1 Inter-band CA between FR1 and FR2

For inter-band NR CA between FR1 and FR2, a carrier aggregation configuration is a combination of operating bands, each supporting a carrier aggregation bandwidth class as specified in clause 5.3A.5 of TS 38.101-1 [2] and clause 5.3A.4 of TS 38.101-2 [3] independently.

### 5.3B UE Channel bandwidth for DC

#### 5.3B.0 General

For intra-band contiguous EN-DC, the aggregated channel bandwidth is sum of the individual NR and E-UTRA channel bandwidths assuming nominal EN-DC channel with 0 kHz offset spacing as specified in clause 5.4.

$$ENBW = BW_{NR\_Channel} + BW_{E-UTRA\_Channel}$$

In the case where the NR sub-block and/or the E-UTRA sub-block itself is composed of intra-band contiguous CA carriers, the EN-DC aggregated channel bandwidth is the sum of the aggregated channel bandwidths of the NR and E-UTRA sub-blocks assuming nominal EN-DC channel spacing between the NR sub-block and E-UTRA sub-block.

$$ENBW = BW_{NR\_Channel\_CA} + BW_{E-UTRA\_Channel\_CA}$$

Intra-band contiguous EN-DC configurations are defined using intra-band contiguous EN-DC bandwidth class notation DC\_(n)Xyz where the first EN-DC bandwidth class letter y indicates the number of contiguous E-UTRA carriers and the second EN-DC bandwidth class letter z indicates the number of contiguous NR carriers for the EN-DC combination of E-UTRA Band X and NR Band nX. Applicable contiguous intra-band EN-DC bandwidth classes are listed in Table 5.3B.0-1.

**Table 5.3B.0-1: Intra-band contiguous EN-DC bandwidth classes**

| Intra-band contiguous EN-DC bandwidth class | Number of contiguous CC |    |
|---|-------------------------|----|
|   | E-UTRA                  | NR |
| AA  | 1                       | 1  |
| CA  | 2                       | 1  |
| DA  | 3                       | 1  |

### 5.3B.1 Intra-band EN-DC in FR1

#### 5.3B.1.1 General

The requirements for intra-band EN-DC in this specification are defined for EN-DC configurations with associated bandwidth combination sets.

For each EN-DC configuration, requirements are specified for all bandwidth combinations contained in a *bandwidth combination set*, which is indicated per supported band combination in the UE radio access capability. A UE can indicate support of several bandwidth combination sets per band combination.

#### 5.3B.1.2 BCS for Intra-band contiguous EN-DC

For intra-band contiguous EN-DC, an EN-DC configuration is consisting of an E-UTRA band and a corresponding NR band having the same frequency range which supports an intra-band contiguous EN-DC bandwidth class.

Bandwidth combination sets for intra-band contiguous EN-DC are specified in Table 5.3B.1.2-1. The EN-DC configurations and bandwidth combination sets in Table 5.3B.1.2-1 also apply to higher order EN-DC combinations that include inter-band and intra-band EN-DC on the downlink and inter-band EN-DC on the uplink. If no BCS is reported in the UE capabilities for an intra-band combination the default is that the UE supports BCS0.

**Table 5.3B.1.2-1: EN-DC configurations and bandwidth combination sets defined for intra-band contiguous EN-DC**

| E-UTRA – NR configuration / Bandwidth combination set |                             |   |   |   |                                    |                           |
|---|-----------------------------|---|---|---|------------------------------------|---------------------------|
| Downlink EN-DC configuration                          | Uplink EN-DC configurations | Component carriers in order of increasing carrier frequency |   |   | Maximum aggregated bandwidth (MHz) | Bandwidth combination set |
|   |                             | Channel bandwidths for E-UTRA carrier (MHz)                 | Channel bandwidths for NR carrier (MHz) | Channel bandwidths for E-UTRA carrier (MHz) |                                    |                           |
| DC_(n)41AA  | DC_(n)41AA                  | 20  | 40, 60, 80,100                          |   | 120                                | 0                         |
|   |                             |   | 40, 60, 80,100                          | 20  |                                    |                           |
|   |                             | 20  | 40, 50, 60, 80,100                      |   | 120                                | 1                         |
|   |                             |   | 40, 50, 60, 80,100                      | 20  |                                    |                           |
| DC_(n)41CA  | DC_(n)41AA                  | 20+20   | 40, 60, 80,100                          |   | 140                                | 0                         |
|   |                             |   | 40, 60, 80,100                          | 20+20                                       |                                    |                           |

|            |            |          |                    |          |     |   |
|------------|------------|----------|--------------------|----------|-----|---|
|            |            | 20+20    | 40, 50, 60, 80,100 |          | 140 | 1 |
|            |            |          | 40, 50, 60, 80,100 | 20+20    |     |   |
| DC_(n)41DA | DC_(n)41AA | 20+20+20 | 40, 60, 80,100     |          | 160 | 0 |
|            |            |          | 40, 60, 80,100     | 20+20+20 |     |   |
|            |            | 20+20+20 | 40, 50, 60, 80,100 |          | 160 | 1 |
|            |            |          | 40, 50, 60, 80,100 | 20+20+20 |     |   |
| DC_(n)71AA | DC_(n)71AA | 15       | 5                  |          | 20  | 0 |
|            |            | 10       | 5, 10              |          |     |   |
|            |            | 5        | 5, 10, 15          |          |     |   |
|            |            |          | 5                  | 15       |     |   |
|            |            |          | 5, 10              | 10       |     |   |
|            |            |          | 5, 10, 15          | 5        |     |   |

NOTE 1: Void  
 NOTE 2: Void  
 NOTE 3: Void  
 NOTE 4: The channel bandwidths for E-UTRA or NR carrier should be at least supported in one of the BCS indicated in E-UTRA bandwidth combination sets or NR bandwidth combination sets if reported.

5.3B.1.3 BCS for Intra-band non-contiguous EN-DC

For intra-band non-contiguous EN-DC, an EN-DC configuration is consisting of an E-UTRA band and a corresponding NR band having the same frequency range which supports E-UTRA and NR carriers, where E-UTRA configuration is indicated by using E-UTRA CA bandwidth class as defined in TS 36.101 [4] and NR configuration is indicated by using NR CA bandwidth class as defined in TS 38.101-1 [2].

Requirements for intra-band non-contiguous EN-DC are defined for the EN-DC configurations and bandwidth combination sets specified in Table 5.3B.1.3-1. The EN-DC configurations and bandwidth combination sets in Table 5.3B.1.3-1 also apply to higher order EN-DC combinations that include inter-band and intra-band EN-DC on the downlink and inter-band EN-DC on the uplink. If no BCS is reported in the UE capabilities for an intra-band combination the default is that the UE supports BCS0.

**Table 5.3B.1.3-1: EN-DC configurations and bandwidth combination sets defined for intra-band non-contiguous EN-DC**

| E-UTRA – NR configuration / Bandwidth combination set |                             |   |   |   |                                    |                           |
|---|-----------------------------|---|---|---|------------------------------------|---------------------------|
| Downlink EN-DC configuration                          | Uplink EN-DC configurations | Component carriers in order of increasing carrier frequency |   |   | Maximum aggregated bandwidth (MHz) | Bandwidth combination set |
|   |                             | Channel bandwidths for E-UTRA carrier (MHz)                 | Channel bandwidths for NR carrier (MHz) | Channel bandwidths for E-UTRA carrier (MHz) |                                    |                           |
| DC_3A_n3A   | DC_3A_n3A <sup>(1)</sup>    |   | 5, 10, 15, 20, 25, 30                   | 5, 10, 15, 20                               | 50                                 | 0                         |
| DC_41A_n41A   | DC_41A_n41A                 | 20  | 40, 60, 80,100                          |   | 120                                | 0                         |
|   |                             |   | 40, 60, 80,100                          | 20  |                                    |                           |
|   |                             | 20  | 40, 50, 60, 80,100                      |   | 120                                | 1                         |
|   |                             |   | 40, 50, 60, 80,100                      | 20  |                                    |                           |
| DC_41C_n41A   | DC_41A_n41A                 | 20+20   | 40, 60, 80,100                          |   | 140                                | 0                         |
|   |                             |   | 40, 60, 80,100                          | 20+20                                       |                                    |                           |
|   |                             | 20+20   | 40, 50, 60, 80,100                      |   | 140                                | 1                         |
|   |                             |   | 40, 50, 60, 80,100                      | 20+20                                       |                                    |                           |

|             |             |          |                    |          |     |   |
|-------------|-------------|----------|--------------------|----------|-----|---|
| DC_41D_n41A | DC_41A_n41A | 20+20+20 | 40, 60, 80,100     |          | 160 | 0 |
|             |             |          | 40, 60, 80,100     | 20+20+20 |     |   |
|             |             | 20+20+20 | 40, 50, 60, 80,100 |          | 160 | 1 |
|             |             |          | 40, 50, 60, 80,100 | 20+20+20 |     |   |

NOTE 1: Only single switched UL is supported in Rel.15

NOTE 2: Void

NOTE 3: The channel bandwidths for E-UTRA or NR carrier should be at least supported in one of the BCS indicated in E-UTRA bandwidth combination sets or NR bandwidth combination sets if reported

## 5.4 Void

### 5.4A Channel arrangement for CA

The channel arrangement for CA operations in FR1 and FR2 as specified in TS 38.101-1 [2] and TS 38.101-2 [3], respectively.

### 5.4B Channel arrangement for DC

The channel arrangement for intra-band EN-DC operations in FR1 is specified in TS 36.101 [4] and TS 38.101-1 [2], respectively.

#### 5.4B.1 Channel spacing for intra-band EN-DC 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 and E-UTRA carrier and an adjacent NR carrier for intra-band contiguous EN-DC is defined as following:

- For NR operating bands with 100 kHz channel raster,

$$\text{Nominal Channel spacing} = (\text{BW}_{\text{E-UTRA\_Channel}} + \text{BW}_{\text{NR\_Channel}})/2$$

- For NR operating bands with 15 kHz channel raster,

- Nominal Channel spacing =  $(\text{BW}_{\text{E-UTRA\_Channel}} + \text{BW}_{\text{NR\_Channel}})/2 + \{-5\text{kHz}, 0\text{kHz}, 5\text{kHz}\}$  for  $\Delta F_{\text{Raster}}$  equals to 15 kHz
- Nominal Channel spacing =  $(\text{BW}_{\text{E-UTRA\_Channel}} + \text{BW}_{\text{NR\_Channel}})/2 + \{-10\text{ kHz}, 0\text{ kHz}, 10\text{ kHz}\}$  for  $\Delta F_{\text{Raster}}$  equals to 30 kHz

where  $\text{BW}_{\text{E-UTRA\_Channel}}$  and  $\text{BW}_{\text{NR\_Channel}}$  are the channel bandwidths of the E-UTRA and NR carriers,  $\Delta F_{\text{Raster}}$  is the band dependent channel raster granularity defined in TS38.101-1[2]. The channel spacing can be adjusted depending on the channel raster to optimize performance in a particular deployment scenario.

For intra-band non-contiguous EN-DC the channel spacing between E-UTRA and NR carriers shall be larger than the nominal channel spacing defined in this clause.

## 5.5 Configuration

### 5.5A Configuration for CA

#### 5.5A.1 Inter-band CA configurations between FR1 and FR2

**Table 5.5A.1-1: Inter-band CA configurations and bandwidth combinations sets between FR1 and FR2 (two bands)**

| NR CA configuration | Uplink CA configuration | NR Band | SCS (kHz) | 5 MHz    | 10 MHz | 15 MHz | 20 MHz | 40 MHz | 50 MHz | 60 MHz | 80 MHz | 90 MHz | 100 MHz | 200 MHz | 400 MHz | Bandwidth combination set |     |
|---------------------|-------------------------|---------|-----------|----------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|---------|---------------------------|-----|
| CA_n8A-n258A        | CA_n8A-n258A            | n8      | 15        | Yes      | Yes    | Yes    | Yes    |        |        |        |        |        |         |         |         | 0                         |     |
|                     |                         |         | 30        |          | Yes    | Yes    | Yes    |        |        |        |        |        |         |         |         |                           |     |
|                     |                         |         | 60        |          |        |        |        |        |        |        |        |        |         |         |         |                           |     |
|                     |                         | n258    | 60        |          |        |        |        |        | Yes    |        |        |        |         | Yes     | Yes     |                           |     |
|                     |                         |         | 120       |          |        |        |        |        | Yes    |        |        |        |         | Yes     | Yes     |                           | Yes |
| CA_n71A-n257A       | -                       | n71     | 15        | Yes      | Yes    | Yes    | Yes    |        |        |        |        |        |         |         |         | 0                         |     |
|                     |                         |         | 30        |          | Yes    | Yes    | Yes    |        |        |        |        |        |         |         |         |                           |     |
|                     |                         |         | 60        |          |        |        |        |        |        |        |        |        |         |         |         |                           |     |
|                     |                         | n257    | 60        |          |        |        |        |        | Yes    |        |        |        |         | Yes     | Yes     |                           |     |
|                     |                         |         | 120       |          |        |        |        |        | Yes    |        |        |        |         | Yes     | Yes     |                           | Yes |
| CA_n77A-n257A       | CA_n77A-n257A           | n77     | 15        |          | Yes    | Yes    | Yes    | Yes    | Yes    |        |        |        |         |         |         | 0                         |     |
|                     |                         |         | 30        |          | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes     |         |         |                           |     |
|                     |                         |         | 60        |          | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes     |         |         |                           |     |
|                     |                         | n257    | 60        |          |        |        |        |        | Yes    |        |        |        |         | Yes     | Yes     |                           |     |
|                     |                         |         | 120       |          |        |        |        |        | Yes    |        |        |        |         | Yes     | Yes     |                           | Yes |
| CA_n77A-n257D       | CA_n77A-n257A           | n77     | 15        |          | Yes    | Yes    | Yes    | Yes    | Yes    |        |        |        |         |         |         | 0                         |     |
|                     |                         |         | 30        |          | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes     |         |         |                           |     |
|                     |                         |         | 60        |          | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes     |         |         |                           |     |
|                     |                         | n257    |           | CA_n257D |        |        |        |        |        |        |        |        |         |         |         |                           |     |
| CA_n77A-n257E       | CA_n77A-n257A           | n77     | 15        | Yes      | Yes    | Yes    | Yes    | Yes    | Yes    |        |        |        |         |         |         | 0                         |     |
|                     |                         |         | 30        | Yes      | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes     |         |         |                           |     |
|                     |                         |         | 60        | Yes      | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes     |         |         |                           |     |
|                     |                         | n257    |           | CA_n257E |        |        |        |        |        |        |        |        |         |         |         |                           |     |
| CA_n77A-n257F       | CA_n77A-n257A           | n77     | 15        |          | Yes    | Yes    | Yes    | Yes    | Yes    |        |        |        |         |         |         | 0                         |     |
|                     |                         |         | 30        |          | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes     |         |         |                           |     |
|                     |                         |         | 60        |          | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes     |         |         |                           |     |
|                     |                         | n257    |           | CA_n257F |        |        |        |        |        |        |        |        |         |         |         |                           |     |
| CA_n77C-n257A       | CA_n77A-n257A           | n77     | CA_n77C   |          |        |        |        |        |        |        |        |        |         |         |         | 0                         |     |
|                     |                         | n257    | 60        |          |        |        |        |        | Yes    |        |        |        |         | Yes     | Yes     |                           |     |
|                     |                         |         | 120       |          |        |        |        |        | Yes    |        |        |        |         | Yes     | Yes     |                           | Yes |

| NR CA configuration | Uplink CA configuration | NR Band | SCS (kHz) | 5 MHz | 10 MHz | 15 MHz | 20 MHz | 40 MHz | 50 MHz | 60 MHz | 80 MHz | 90 MHz | 100 MHz | 200 MHz | 400 MHz | Bandwidth combination set |
|---------------------|-------------------------|---------|-----------|-------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|---------|---------------------------|
| CA_n77C-n257D       | CA_n77A-n257A           | n77     | CA_n77C   |       |        |        |        |        |        |        |        |        |         |         |         | 0                         |
|                     |                         | n257    | CA_n257D  |       |        |        |        |        |        |        |        |        |         |         |         |                           |
| CA_n77C-n257E       | CA_n77A-n257A           | n77     | CA_n77C   |       |        |        |        |        |        |        |        |        |         |         |         | 0                         |
|                     |                         | n257    | CA_n257E  |       |        |        |        |        |        |        |        |        |         |         |         |                           |
| CA_n77C-n257F       | CA_n77A-n257A           | n77     | CA_n77C   |       |        |        |        |        |        |        |        |        |         |         |         | 0                         |
|                     |                         | n257    | CA_n257F  |       |        |        |        |        |        |        |        |        |         |         |         |                           |
| CA_n78A-n257A       | CA_n78A-n257A           | n78     | 15        |       | Yes    | Yes    | Yes    | Yes    | Yes    |        |        |        |         |         |         | 0                         |
|                     |                         |         | 30        |       | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes     |         |         |                           |
|                     |                         |         | 60        |       | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes     |         |         |                           |
|                     |                         | n257    | 60        |       |        |        |        |        | Yes    |        |        |        | Yes     | Yes     |         |                           |
|                     |                         |         | 120       |       |        |        |        |        | Yes    |        |        |        | Yes     | Yes     | Yes     |                           |
| CA_n78A-n257D       | CA_n78A-n257A           | n78     | 15        |       | Yes    | Yes    | Yes    | Yes    | Yes    |        |        |        |         |         |         | 0                         |
|                     |                         |         | 30        |       | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes     |         |         |                           |
|                     |                         |         | 60        |       | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes     |         |         |                           |
|                     |                         | n257    | CA_n257D  |       |        |        |        |        |        |        |        |        |         |         |         |                           |
|                     |                         |         |           |       |        |        |        |        |        |        |        |        |         |         |         |                           |
| CA_n78A-n257E       | CA_n78A-n257A           | n78     | 15        |       | Yes    | Yes    | Yes    | Yes    | Yes    |        |        |        |         |         |         | 0                         |
|                     |                         |         | 30        |       | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes     |         |         |                           |
|                     |                         |         | 60        |       | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes     |         |         |                           |
|                     |                         | n257    | CA_n257E  |       |        |        |        |        |        |        |        |        |         |         |         |                           |
|                     |                         |         |           |       |        |        |        |        |        |        |        |        |         |         |         |                           |
| CA_n78A-n257F       | CA_n78A-n257A           | n78     | 15        |       | Yes    | Yes    | Yes    | Yes    | Yes    |        |        |        |         |         |         | 0                         |
|                     |                         |         | 30        |       | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes     |         |         |                           |
|                     |                         |         | 60        |       | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes    | Yes     |         |         |                           |
|                     |                         | n257    | CA_n257F  |       |        |        |        |        |        |        |        |        |         |         |         |                           |
|                     |                         |         |           |       |        |        |        |        |        |        |        |        |         |         |         |                           |
| CA_n78C-n257A       | CA_n78A-n257A           | n78     | CA_n78C   |       |        |        |        |        |        |        |        |        |         |         |         | 0                         |
|                     |                         | n257    | 60        |       |        |        |        |        | Yes    |        |        |        | Yes     | Yes     |         |                           |
|                     |                         |         | 120       |       |        |        |        |        | Yes    |        |        |        | Yes     | Yes     | Yes     |                           |
| CA_n78C-n257D       | CA_n78A-n257A           | n78     | CA_n78C   |       |        |        |        |        |        |        |        |        |         |         |         | 0                         |
|                     |                         | n257    | CA_n257D  |       |        |        |        |        |        |        |        |        |         |         |         |                           |
| CA_n78C-n257E       | CA_n78A-n257A           | n78     | CA_n78C   |       |        |        |        |        |        |        |        |        |         |         |         | 0                         |
|                     |                         | n257    | CA_n257E  |       |        |        |        |        |        |        |        |        |         |         |         |                           |
| CA_n78C-n257F       | CA_n78A-n257A           | n78     | CA_n78C   |       |        |        |        |        |        |        |        |        |         |         |         | 0                         |
|                     |                         | n257    | CA_n257F  |       |        |        |        |        |        |        |        |        |         |         |         |                           |
| CA_n79A-n257A       | CA_n79A-n257A           | n79     | 15        |       |        |        |        | Yes    | Yes    |        |        |        |         |         |         | 0                         |
|                     |                         |         | 30        |       |        |        |        | Yes    | Yes    | Yes    | Yes    |        | Yes     |         |         |                           |

| NR CA configuration   | Uplink CA configuration | NR Band | SCS (kHz)                                    | 5 MHz    | 10 MHz | 15 MHz | 20 MHz | 40 MHz | 50 MHz | 60 MHz | 80 MHz | 90 MHz | 100 MHz | 200 MHz | 400 MHz | Bandwidth combination set |     |
|---|-------------------------|---------|--|----------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|---------|---------------------------|-----|
|   |                         |         | 60   |          |        |        |        | Yes    | Yes    | Yes    | Yes    |        | Yes     |         |         |                           |     |
|   |                         | n257    | 60   |          |        |        |        | Yes    |        |        |        |        | Yes     | Yes     |         |                           |     |
|   |                         | n257    | 120  |          |        |        |        | Yes    |        |        |        |        | Yes     | Yes     | Yes     |                           |     |
| CA_n79A-n257D   | CA_n79A-n257A           | n79     | 15   |          |        |        |        | Yes    | Yes    |        |        |        |         |         |         | 0                         |     |
|   |                         |         | 30   |          |        |        |        | Yes    | Yes    | Yes    | Yes    |        | Yes     |         |         |                           |     |
|   |                         |         | 60   |          |        |        |        | Yes    | Yes    | Yes    | Yes    |        | Yes     |         |         |                           |     |
|   |                         | n257    |  | CA_n257D |        |        |        |        |        |        |        |        |         |         |         |                           |     |
| CA_n79A-n257E   | CA_n79A-n257A           | n79     | 15   |          |        |        |        | Yes    | Yes    |        |        |        |         |         |         | 0                         |     |
|   |                         |         | 30   |          |        |        |        | Yes    | Yes    | Yes    | Yes    |        | Yes     |         |         |                           |     |
|   |                         |         | 60   |          |        |        |        | Yes    | Yes    | Yes    | Yes    |        | Yes     |         |         |                           |     |
|   |                         | n257    |  | CA_n257E |        |        |        |        |        |        |        |        |         |         |         |                           |     |
| CA_n79A-n257F   | CA_n79A-n257A           | n79     | 15   |          |        |        |        | Yes    | Yes    |        |        |        |         |         |         | 0                         |     |
|   |                         |         | 30   |          |        |        |        | Yes    | Yes    | Yes    | Yes    |        | Yes     |         |         |                           |     |
|   |                         |         | 60   |          |        |        |        | Yes    | Yes    | Yes    | Yes    |        | Yes     |         |         |                           |     |
|   |                         | n257    |  | CA_n257F |        |        |        |        |        |        |        |        |         |         |         |                           |     |
| CA_n79C-n257A   | CA_n79A-n257A           | n79     | See CA_n79C in Table 5.5A.1-1 in TS 38.101-1 |          |        |        |        |        |        |        |        |        |         |         |         | 0                         |     |
|   |                         | n257    | 60   |          |        |        |        |        | Yes    |        |        |        |         | Yes     | Yes     |                           |     |
|   |                         |         | 120  |          |        |        |        |        | Yes    |        |        |        |         | Yes     | Yes     |                           | Yes |
| CA_n79C-n257D   | CA_n79A-n257A           | n79     | CA_n79C                                      |          |        |        |        |        |        |        |        |        |         |         |         | 0                         |     |
|   |                         | n257    | CA_n257D                                     |          |        |        |        |        |        |        |        |        |         |         |         |                           |     |
| CA_n79C-n257E   | CA_n79A-n257A           | n79     | CA_n79C                                      |          |        |        |        |        |        |        |        |        |         |         |         | 0                         |     |
|   |                         | n257    | CA_n257E                                     |          |        |        |        |        |        |        |        |        |         |         |         |                           |     |
| CA_n79C-n257F   | CA_n79A-n257A           | n79     | CA_n79C                                      |          |        |        |        |        |        |        |        |        |         |         |         | 0                         |     |
|   |                         | n257    | CA_n257F                                     |          |        |        |        |        |        |        |        |        |         |         |         |                           |     |
| NOTE: The CA configurations are given in Table 5.5A.1-1 of either TS 38.101-1 or TS 38.101-2 where unless otherwise stated BCS0 is referred to. |                         |         |  |          |        |        |        |        |        |        |        |        |         |         |         |                           |     |



## 5.5B Configuration for DC

### 5.5B.1 General

The operating bands and bandwidth classes are specified for operation with EN-DC, NGEN-DC, NE-DC or NR-DC configured. The EN-DC, NGEN-DC or NE-DC band combinations include at least one E-UTRA operating band.

For EN-DC or NE-DC configurations indicated by column "Single Uplink allowed" (e.g., problematic band combinations as defined in TS 38.306 [11]) in tables in this clause the UE may indicate capability of not supporting simultaneous dual and triple uplink operation due to possible intermodulation interference to its own primary downlink channel bandwidth of PCell or PSCell if the intermodulation order is 2 or if the intermodulation order is 3 for the combinations when both operating bands are between 450 MHz – 960 MHz or between 1427 MHz – 2690 MHz.

In the case for EN-DC or NE-DC configurations listed in tables in this clause for which the intermodulation products caused by the dual and triple uplink operation fall into the receive band but do not interfere with its own primary downlink channel bandwidth of PCell or PSCell as defined in Annex I the UE is mandated to operate in dual and triple uplink mode. Single Uplink is also allowed for certain band combinations where intermodulation or reverse intermodulation products could create difficulty for meeting emission requirements.

For EN-DC combinations of order 3 or higher, "Single Uplink allowed" UL configurations captured in Table 5.5B.2-1, Table 5.5B.3-1, and Table 5.5B.4-1 apply.

If multiple UL DC configurations are listed for multiple DL DC configurations, valid uplink configurations are such that uplink does not have more carriers than downlink.

Non-contiguous resource allocation and almost contiguous allocation are not applicable for E-UTRA or NR carrier part of intra-band EN-DC configuration.

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

For a higher order EN-DC band combination of which DC\_20\_n28/ DC\_28\_n20/ CA\_20-28/ CA\_n20-n28 is a subset, the frequency range in band n28/28 is restricted for the higher order band combination to 703-733 MHz for the UL and 758-788 MHz for the DL.

For NR inter-band dual connectivity specified in 5.5B.7, the corresponding NR CA configurations in 5.5A.1, i.e., dual uplink inter-band carrier aggregation between FR1 and FR2 with uplink assigned to two NR bands, are applicable to Dual Connectivity.

NOTE 1: Requirements for the dual connectivity configurations are defined in the clause corresponding NR uplink CA between FR1 and FR2 configurations, unless otherwise specified.

### 5.5B.2 Intra-band contiguous EN-DC

**Table 5.5B.2-1: Intra-band contiguous EN-DC configurations**

| EN-DC configuration  | Uplink EN-DC configuration (NOTE 1) | Single UL allowed |
|--|-------------------------------------|-------------------|
| DC_(n)41AA <sup>5</sup><br>DC_(n)41CA <sup>5</sup><br>DC_(n)41DA <sup>5</sup>                                  | DC_(n)41AA                          | Yes <sup>3</sup>  |
| DC_(n)71AA <sup>2</sup>  | DC_(n)71AA                          | No <sup>4</sup>   |
| NOTE 1: Uplink EN-DC configurations are the configurations supported by the present release of specifications. |                                     |                   |
| NOTE 2: Requirements in this specification apply for NR SCS of 15 kHz only.                                    |                                     |                   |

NOTE 3: Single UL allowed due to potential emission issues, not self-interference.  
 NOTE 4: For UE(s) supporting dynamic power sharing it is mandatory to do dual simultaneous UL. For UE(s) not supporting dynamic power sharing single UL is allowed.  
 NOTE 5: The minimum requirements only apply for non-simultaneous Tx/Rx between all carriers.

### 5.5B.3 Intra-band non-contiguous EN-DC

**Table 5.5B.3-1: Intra-band non-contiguous EN-DC configurations**

| EN-DC configuration  | Uplink EN-DC configuration (NOTE 1) | Single UL allowed |
|--|-------------------------------------|-------------------|
| DC_3A_n3A  | DC_3A_n3A <sup>2</sup>              | Yes <sup>2</sup>  |
| DC_41A_n41A <sup>3</sup><br>DC_41C_n41A <sup>3</sup><br>DC_41D_n41A <sup>3</sup> | DC_41A_n41A                         | Yes <sup>4</sup>  |

NOTE 1: Uplink EN-DC configurations are the configurations supported by the present release of specifications.  
 NOTE 2: Only single switched UL is supported in Rel.15  
 NOTE 3: The minimum requirements only apply for non-simultaneous Tx/Rx between all carriers.  
 NOTE 4: Single UL allowed due to potential emission issues, not self-interference.

### 5.5B.4 Inter-band EN-DC within FR1

#### 5.5B.4.1 Inter-band EN-DC configurations within FR1 (two bands)

**Table 5.5B.4.1-1: Inter-band EN-DC configurations within FR1 (two bands)**

| EN-DC configuration   | Uplink EN-DC configuration (NOTE 1) | Single UL allowed |
|---|-------------------------------------|-------------------|
| DC_1A_n28A  | DC_1A_n28A                          | No                |
| DC_1A_n40A  | DC_1A_n40A                          | No                |
| DC_1A_n51A  | DC_1A_n51A                          | No                |
| DC_1A_n77A <sup>7</sup><br>DC_1A_n77C <sup>7</sup>                            | DC_1A_n77A                          | DC_1_n77          |
| DC_1A_n78A <sup>7</sup><br>DC_1A_n78C <sup>7</sup>                            | DC_1A_n78A                          | No                |
| DC_1A_n79A <sup>7</sup><br>DC_1A_n79C <sup>7</sup>                            | DC_1A_n79A                          | No                |
| DC_2A_n5A   | DC_2A_n5A                           | No                |
| DC_2A_n66A  | DC_2A_n66A                          | DC_2_n66          |
| DC_2A_n71A  | DC_2A_n71A                          | No                |
| DC_2A_n78A  | DC_2A_n78A                          | DC_2_n78          |
| DC_3A_n7A   | DC_3A_n7A                           | No                |
| DC_3A_n28A  | DC_3A_n28A                          | No                |
| DC_3A_n40A  | DC_3A_n40A                          | No                |
| DC_3A_n51A  | DC_3A_n51A                          | No                |
| DC_3A_n77A <sup>7</sup><br>DC_3A_n77C <sup>7</sup>                            | DC_3A_n77A                          | DC_3_n77          |
| DC_3A_n78A <sup>7</sup><br>DC_3A_n78C <sup>7</sup><br>DC_3C_n78A <sup>7</sup> | DC_3A_n78A                          | DC_3_n78          |
| DC_3A_n79A <sup>7</sup><br>DC_3A_n79C <sup>7</sup>                            | DC_3A_n79A                          | No                |
| DC_5A_n40A  | DC_5A_n40A                          | No                |
| DC_5A_n66A  | DC_5A_n66A                          | DC_5_n66          |

| EN-DC configuration                                  | Uplink EN-DC configuration (NOTE 1) | Single UL allowed |
|--|-------------------------------------|-------------------|
| DC_5A_n78A <sup>7</sup>                              | DC_5A_n78A                          | No                |
| DC_7A-7A_n78A <sup>7</sup>                           | DC_7A_n78A                          | No                |
| DC_7A_n28A   | DC_7A_n28A                          | No                |
| DC_7A_n51A   | DC_7A_n51A                          | No                |
| DC_7A_n78A <sup>7</sup>                              | DC_7A_n78A                          | No                |
| DC_7C_n78A <sup>7</sup>                              | DC_7A_n78A                          | No                |
| DC_8A_n40A <sup>7</sup>                              | DC_8A_n40A                          | No                |
| DC_8A_n77A <sup>7</sup>                              | DC_8A_n77A                          | No                |
| DC_8A_n78A <sup>7</sup>                              | DC_8A_n78A                          | No                |
| DC_8A_n79A <sup>7</sup>                              | DC_8A_n79A                          | No                |
| DC_11A_n77A <sup>7</sup>                             | DC_11A_n77A                         | No                |
| DC_11A_n78A <sup>7</sup>                             | DC_11A_n78A                         | No                |
| DC_11A_n79A <sup>7</sup>                             | DC_11A_n79A                         | No                |
| DC_12A_n5A   | DC_12A_n5A                          | No                |
| DC_12A_n66A  | DC_12A_n66A                         | No                |
| DC_18A_n77A <sup>7</sup>                             | DC_18A_n77A                         | No                |
| DC_18A_n78A <sup>7</sup>                             | DC_18A_n78A                         | No                |
| DC_18A_n79A <sup>7</sup>                             | DC_18A_n79A                         | No                |
| DC_19A_n77A <sup>7</sup><br>DC_19A_n77C <sup>7</sup> | DC_19A_n77A                         | No                |
| DC_19A_n78A <sup>7</sup><br>DC_19A_n78C <sup>7</sup> | DC_19A_n78A                         | No                |
| DC_19A_n79A <sup>7</sup><br>DC_19A_n79C <sup>7</sup> | DC_19A_n79A                         | No                |
| DC_20A_n8A   | DC_20A_n8A                          | DC_20_n8          |
| DC_20A_n28A <sup>8,10,11</sup>                       | DC_20A_n28A                         | No                |
| DC_20A_n51A  | DC_20A_n51A                         | No                |
| DC_20A_n77A <sup>7</sup>                             | DC_20A_n77A                         | No                |
| DC_20A_n78A <sup>7</sup>                             | DC_20A_n78A                         | No                |
| DC_21A_n77A <sup>7</sup><br>DC_21A_n77C <sup>7</sup> | DC_21A_n77A                         | No                |
| DC_21A_n78A <sup>7</sup><br>DC_21A_n78C <sup>7</sup> | DC_21A_n78A                         | No                |
| DC_21A_n79A <sup>7</sup><br>DC_21A_n79C <sup>7</sup> | DC_21A_n79A                         | No                |
| DC_25A_n41A  | DC_25A_n41A                         | No                |
| DC_26A_n41A  | DC_26A_n41A                         | No                |
| DC_26A_n77A <sup>7</sup>                             | DC_26A_n77A                         | No                |
| DC_26A_n78A <sup>7</sup>                             | DC_26A_n78A                         | No                |
| DC_26A_n79A <sup>7</sup>                             | DC_26A_n79A                         | No                |
| DC_28A_n51A  | DC_28A_n51A                         | No                |
| DC_28A_n77A <sup>7</sup><br>DC_28A_n77C <sup>7</sup> | DC_28A_n77A                         | No                |
| DC_28A_n78A <sup>7</sup><br>DC_28A_n78C <sup>7</sup> | DC_28A_n78A                         | No                |
| DC_28A_n79A <sup>7</sup><br>DC_28A_n79C <sup>7</sup> | DC_28A_n79A                         | No                |
| DC_30A_n5A   | DC_30A_n5A                          | No                |
| DC_30A_n66A  | DC_30A_n66A                         | No                |
| DC_38A_n78A <sup>7</sup>                             | DC_38A_n78A                         | No                |
| DC_39A_n78A <sup>5,7</sup>                           | DC_39A_n78A                         | No                |

| EN-DC configuration  | Uplink EN-DC configuration (NOTE 1) | Single UL allowed |
|--|-------------------------------------|-------------------|
| DC_39A_n79A <sup>7</sup>   | DC_39A_n79A                         | No                |
| DC_40A_n77A  | DC_40A_n77A                         | No                |
| DC_41A_n77A<br>DC_41C_n77A   | DC_41A_n77A                         | No                |
| DC_41A_n78A<br>DC_41C_n78A   | DC_41A_n78A                         | No                |
| DC_41A_n79A <sup>6,7</sup><br>DC_41C_n79A <sup>6,7</sup>   | DC_41A_n79A                         | No                |
| DC_42A_n51A  | DC_42A_n51A                         | No                |
| DC_42A_n77A <sup>3,4,9</sup><br>DC_42A_n77C <sup>3,4,9</sup><br>DC_42C_n77A <sup>3,4,9</sup><br>DC_42C_n77C <sup>3,4,9</sup><br>DC_42D_n77A <sup>3,4,9</sup><br>DC_42E_n77A <sup>3,4,9</sup>   | N/A                                 | N/A               |
| DC_42A_n78A <sup>3,4,9</sup><br>DC_42A_n78C <sup>3,4,9</sup><br>DC_42C_n78A <sup>3,4,9</sup><br>DC_42C_n78C <sup>3,4,9</sup><br>DC_42D_n78A <sup>3,4,9</sup><br>DC_42E_n78A <sup>3,4,9</sup>   | N/A                                 | N/A               |
| DC_42A_n79A <sup>9,15</sup><br>DC_42A_n79C <sup>9,15</sup><br>DC_42C_n79A <sup>9,15</sup><br>DC_42C_n79C <sup>9,15</sup><br>DC_42D_n79A <sup>9,15</sup><br>DC_42E_n79A <sup>9,15</sup>   | N/A                                 | N/A               |
| DC_46A_n78A <sup>2</sup><br>DC_46C_n78A <sup>2</sup><br>DC_46D_n78A <sup>2</sup><br>DC_46E_n78A <sup>2</sup>   | N/A                                 | N/A               |
| DC_66A_n5A   | DC_66A_n5A                          | DC_66_n5          |
| DC_66A_n71A  | DC_66A_n71A                         | No                |
| DC_66A_n78A  | DC_66A_n78A                         | No                |
| <p>NOTE 1: Uplink EN-DC configurations are the configurations supported by the present release of specifications.</p> <p>NOTE 2: Restricted to E-UTRA operation when inter-band carrier aggregation is configured. The downlink operating band for Band 46 is paired with the uplink operating band (external E-UTRA band) of the carrier aggregation configuration that is supporting the configured Pcell.</p> <p>NOTE 3: The minimum requirements apply only when there is non-simultaneous Tx/Rx operation between E-UTRA and NR carriers. This restriction applies also for these carriers when applicable EN-DC configuration is part of a higher order EN-DC configuration.</p> <p>NOTE 4: The minimum requirements for intra-band non-contiguous EN-DC apply. When UE capability <i>interBandContiguousMRDC</i> is indicated, the minimum requirements for intra-band-contiguous EN-DC also should be met in addition to intra-band non-contiguous EN-DC. The intra-band requirements also apply for these carriers when applicable EN-DC configuration is a subset of a higher order EN-DC configuration.</p> <p>NOTE 5: The frequency range above 3600 MHz for Band n78 is not used in this combination.</p> <p>NOTE 6: The frequency range below 2506 MHz for Band 41 is not used in this combination.</p> <p>NOTE 7: Applicable for UE supporting inter-band EN-DC with mandatory simultaneous Rx/Tx capability.</p> <p>NOTE 8: The frequency range in band n28 / 28 is restricted for this band combination to 703 - 733 MHz for the UL and 758-788 MHz for the DL. This restriction also apply for any band combinations when DC_20_n28/ DC_28_n20/ CA_20-28/ CA_n20-n28 is a subset of a higher order band combination.</p> <p>NOTE 9: The combination is not used alone as fall back mode of other band combinations in which UL in Band 42 is not used.</p> |                                     |                   |

| EN-DC configuration  | Uplink EN-DC configuration (NOTE 1) | Single UL allowed |
|--|-------------------------------------|-------------------|
| <p>NOTE 10: The minimum requirements apply for DL carriers with a maximum power spectral density imbalance of [6] dB. The power spectral density imbalance condition also applies for these carriers when applicable EN-DC configuration is a subset of a higher order EN-DC configuration</p> <p>NOTE 11: The minimum requirements apply for synchronized DL carriers with a maximum receive time difference <math>\leq 3</math> usec. The requirements also apply for these carriers when applicable EN-DC configuration is a subset of a higher order EN-DC configuration</p> <p>NOTE 12: Void.</p> <p>NOTE 13: Void.</p> <p>NOTE 14: Void.</p> <p>NOTE 15: Simultaneous Rx/Tx capability does not apply for UEs supporting band 42 with a n77 implementation only. Same restrictions are applied to related higher order configurations.</p> |                                     |                   |

5.5B.4.2 Inter-band EN-DC configurations within FR1 (three bands)

Table 5.5B.4.2-1: Inter-band EN-DC configurations within FR1 (three bands)

| EN-DC configuration  | Uplink EN-DC configuration (NOTE 1) |
|--|-------------------------------------|
| DC_1A-3A_n28A  | DC_1A_n28A<br>DC_3A_n28A            |
| DC_1A-3A_n77A <sup>5</sup><br>DC_1A-3A_n77C <sup>5</sup>                               | DC_1A_n77A<br>DC_3A_n77A            |
| DC_1A-3A_n78A <sup>5</sup><br>DC_1A-3A_n78C <sup>5</sup><br>DC_1A-3C_n78A <sup>5</sup> | DC_1A_n78A<br>DC_3A_n78A            |
| DC_1A-3A_n79A <sup>5</sup><br>DC_1A-3A_n79C <sup>5</sup>                               | DC_1A_n79A<br>DC_3A_n79A            |
| DC_1A-5A_n78A <sup>5</sup>   | DC_1A_n78A<br>DC_5A_n78A            |
| DC_1A-7A_n28A <sup>5</sup>   | DC_1A_n28A<br>DC_7A_n28A            |
| DC_1A-7A_n78A <sup>5</sup>   | DC_1A_n78A<br>DC_7A_n78A            |
| DC_1A-7A-7A_n78A <sup>5</sup>  | DC_1A_n78A<br>DC_7A_n78A            |
| DC_1A-8A_n78A <sup>5</sup>   | DC_1A_n78A<br>DC_8A_n78A            |
| DC_1A-18A_n77A <sup>5</sup>  | DC_1A_n77A<br>DC_18A_n77A           |
| DC_1A-18A_n78A <sup>5</sup>  | DC_1A_n78A<br>DC_18A_n78A           |
| DC_1A-18A_n79A   | DC_1A_n79A<br>DC_18A_n79A           |
| DC_1A-19A_n77A <sup>5</sup><br>DC_1A-19A_n77C <sup>5</sup>                             | DC_1A_n77A<br>DC_19A_n77A           |
| DC_1A-19A_n78A <sup>5</sup><br>DC_1A-19A_n78C <sup>5</sup>                             | DC_1A_n78A<br>DC_19A_n78A           |
| DC_1A-19A_n79A <sup>5</sup><br>DC_1A-19A_n79C <sup>5</sup>                             | DC_1A_n79A<br>DC_19A_n79A           |
| DC_1A-20A_n28A <sup>6</sup>  | DC_1A_n28A<br>DC_20A_n28A           |
| DC_1A-20A_n78A <sup>5</sup>  | DC_1A_n78A<br>DC_20A_n78A           |
| DC_1A-21A_n77A <sup>5</sup><br>DC_1A-21A_n77C <sup>5</sup>                             | DC_1A_n77A<br>DC_21A_n77A           |
| DC_1A-21A_n78A <sup>5</sup><br>DC_1A-21A_n78C <sup>5</sup>                             | DC_1A_n78A<br>DC_21A_n78A           |
| DC_1A-21A_n79A <sup>5</sup>  | DC_1A_n79A                          |

| EN-DC configuration  | Uplink EN-DC configuration (NOTE 1)       |
|--|---|
| DC_1A-21A_n79C <sup>5</sup>  | DC_21A_n79A                               |
| DC_1A-28A_n77A <sup>5</sup><br>DC_1A-28A_n77C <sup>5</sup>   | DC_1A_n77A<br>DC_28A_n77A                 |
| DC_1A-28A_n78A <sup>5</sup><br>DC_1A-28A_n78C <sup>5</sup>   | DC_1A_n78A<br>DC_28A_n78A                 |
| DC_1A_n28A-n78A <sup>5</sup>   | DC_1A_n28A<br>DC_1A_n78A                  |
| DC_1A-28A_n79A<br>DC_1A-28A_n79C   | DC_1A_n79A<br>DC_28A_n79A                 |
| DC_1A-41A_n77A<br>DC_1A-41C_n77A   | DC_1A_n77A<br>DC_41A_n77A                 |
| DC_1A-41A_n78A<br>DC_1A-41C_n78A   | DC_1A_n78A<br>DC_41A_n78A                 |
| DC_1A-41C_n79A   | DC_1A_n79A                                |
| DC_1A-42A_n77A<br>DC_1A-42A_n77C<br>DC_1A-42C_n77A<br>DC_1A-42C_n77C<br>DC_1A-42D_n77A<br>DC_1A-42E_n77A | DC_1A_n77A                                |
| DC_1A-42A_n78A<br>DC_1A-42A_n78C<br>DC_1A-42C_n78A<br>DC_1A-42C_n78C<br>DC_1A-42D_n78A<br>DC_1A-42E_n78A | DC_1A_n78A                                |
| DC_1A-42A_n79A<br>DC_1A-42A_n79C<br>DC_1A-42C_n79A<br>DC_1A-42C_n79C<br>DC_1A-42D_n79A<br>DC_1A-42E_n79A | DC_1A_n79A                                |
| DC_1A_n77A-n79A <sup>7</sup>   | DC_1A_n77A<br>DC_1A_n79A                  |
| DC_1A_n78A-n79A <sup>8</sup>   | DC_1A_n78A<br>DC_1A_n79A                  |
| DC_1A_SUL_n78A-n84A <sup>5</sup>   | DC_1A_n78A,<br>DC_1A_n84A_ULSUP-TDM_n78A, |
| DC_2A-5A_n66A  | DC_2A_n66A<br>DC_5A_n66A                  |
| DC_2A-12A_n66A   | DC_2A_n66A<br>DC_12A_n66A                 |
| DC_2A-30A_n66A   | DC_2A_n66A<br>DC_30A_n66A                 |
| DC_2A-66A_n71A   | DC_2A_n71A<br>DC_66A_n71A                 |
| DC_2A-(n)71AA  | DC_2A_n71A<br>DC_(n)71AA                  |
| DC_3A_n3A-n77A   | DC_3A_n77A<br>DC_3A_n3A <sup>2</sup>      |
| DC_3A_n3A-n78A   | DC_3A_n78A<br>DC_3A_n3A <sup>2</sup>      |
| DC_3A-5A_n78A <sup>5</sup>   | DC_3A_n78A<br>DC_5A_n78A                  |
| DC_3A-7A_n28A  | DC_3A_n28A<br>DC_7A_n28A                  |
| DC_3A-7A_n78A <sup>5</sup><br>DC_3C-7A_n78A <sup>5</sup>   | DC_3A_n78A<br>DC_7A_n78A                  |
| DC_3A-7C_n78A <sup>5</sup><br>DC_3C-7C_n78A <sup>5</sup>   | DC_3A_n78A<br>DC_7A_n78A                  |

| EN-DC configuration  | Uplink EN-DC configuration (NOTE 1)      |
|--|--|
| DC_3A-7A-7A_n78A <sup>5</sup>  | DC_3A_n78A<br>DC_7A_n78A                 |
| DC_3A-8A_n78A  | DC_3A_n78A<br>DC_8A_n78A                 |
| DC_3A-19A_n77A <sup>5</sup><br>DC_3A-19A_n77C <sup>5</sup>   | DC_3A_n77A<br>DC_19A_n77A                |
| DC_3A-19A_n78A <sup>5</sup><br>DC_3A-19A_n78C <sup>5</sup>   | DC_3A_n78A<br>DC_19A_n78A                |
| DC_3A-19A_n79A <sup>5</sup><br>DC_3A-19A_n79C <sup>5</sup>   | DC_3A_n79A<br>DC_19A_n79A                |
| DC_3A-20A_n28A <sup>5,6</sup>  | DC_3A_n28A<br>DC_20A_n28A                |
| DC_3A-20A_n78A <sup>5</sup><br>DC_3C-20A_n78A <sup>5</sup>   | DC_3A_n78A<br>DC_20A_n78A                |
| DC_3A-21A_n77A <sup>5</sup><br>DC_3A-21A_n77C <sup>5</sup>   | DC_3A_n77A<br>DC_21A_n77A                |
| DC_3A-21A_n78A <sup>5</sup><br>DC_3A-21A_n78C <sup>5</sup>   | DC_3A_n78A<br>DC_21A_n78A                |
| DC_3A-21A_n79A <sup>5</sup><br>DC_3A-21A_n79C <sup>5</sup>   | DC_3A_n79A<br>DC_21A_n79A                |
| DC_3A-28A_n77A<br>DC_3A-28A_n77C   | DC_3A_n77A<br>DC_28A_n77A                |
| DC_3A-28A_n78A <sup>5</sup><br>DC_3A-28A_n78C <sup>5</sup>   | DC_3A_n78A<br>DC_28A_n78A                |
| DC_3A_n28A-n78A <sup>5</sup>   | DC_3A_n28A<br>DC_3A_n78A                 |
| DC_3A-28A_n79A<br>DC_3A-28A_n79C   | DC_3A_n79A<br>DC_28A_n79A                |
| DC_3A-38A_n78A   | DC_3A_n78A                               |
| DC_3A-41A_n78A   | DC_3A_n78A<br>DC_41A_n78A                |
| DC_3A-42A_n77A<br>DC_3A-42A_n77C<br>DC_3A-42C_n77A<br>DC_3A-42C_n77C<br>DC_3A-42D_n77A<br>DC_3A-42E_n77A | DC_3A_n77A                               |
| DC_3A-42A_n78A<br>DC_3A-42A_n78C<br>DC_3A-42C_n78A<br>DC_3A-42C_n78C<br>DC_3A-42D_n78A<br>DC_3A-42E_n78A | DC_3A_n78A                               |
| DC_3A-42A_n79A<br>DC_3A-42A_n79C<br>DC_3A-42C_n79A<br>DC_3A-42C_n79C<br>DC_3A-42D_n79A<br>DC_3A-42E_n79A | DC_3A_n79A                               |
| DC_3A_n77A-n79A <sup>7</sup>   | DC_3A_n77A<br>DC_3A_n79A                 |
| DC_3A_n78A-n79A <sup>8</sup>   | DC_3A_n78A<br>DC_3A_n79A                 |
| DC_3A_SUL_n78A-n80A <sup>5</sup>   | DC_3A_n78A<br>DC_3A_n80A_ULSUP-TDM_n78A  |
| DC_3A_SUL_n78A-n82A <sup>5</sup>   | DC_3A_n78A<br>DC_3A_n82A                 |
| DC_3A_SUL_n79A-n80A <sup>5</sup>   | DC_3A_n79A,<br>DC_3A_n80A_ULSUP-TDM_n79A |
| DC_5A-7A_n78A  | DC_5A_n78A<br>DC_7A_n78A                 |

| EN-DC configuration  | Uplink EN-DC configuration (NOTE 1)       |
|--|---|
| DC_5A-7A-7A_n78A   | DC_5A_n78A<br>DC_7A_n78A                  |
| DC_5A-30A_n66A   | DC_5A_n66A<br>DC_30A_n66A                 |
| DC_7A-20A_n28A <sup>6</sup>  | DC_7A_n28A<br>DC_20A_n28A                 |
| DC_7A-20A_n78A <sup>5</sup>  | DC_7A_n78A<br>DC_20A_n78A                 |
| DC_7A-28A_n78A <sup>5</sup>  | DC_7A_n78A<br>DC_28A_n78A                 |
| DC_7C-28A_n78A <sup>5</sup>  | DC_7A_n78A<br>DC_28A_n78A                 |
| DC_7A_n28A-n78A <sup>5</sup>   | DC_7A_n28A,<br>DC_7A_n78A                 |
| DC_7A-46A_n78A <sup>3</sup><br>DC_7A-46C_n78A <sup>3</sup><br>DC_7A-46D_n78A <sup>3</sup><br>DC_7A-46E_n78A <sup>3</sup> | DC_7A_n78A                                |
| DC_8A_SUL_n78A-n81A <sup>5</sup>   | DC_8A_n78A,<br>DC_8A_n81A_ULSUP-TDM_n78A, |
| DC_8A_SUL_n79A-n81A <sup>5</sup>   | DC_8A_n79A,<br>DC_8A_n81A_ULSUP-TDM_n79A, |
| DC_12A-30A_n66A  | DC_12A_n66A<br>DC_30A_n66A                |
| DC_18A-28A_n77A <sup>5</sup>   | DC_18A_n77A<br>DC_28A_n77A                |
| DC_18A-28A_n78A <sup>5</sup>   | DC_18A_n78A<br>DC_28A_n78A                |
| DC_18A-28A_n79A <sup>5</sup>   | DC_18A_n79A<br>DC_28A_n79A                |
| DC_19A-21A_n78A <sup>5</sup><br>DC_19A-21A_n78C <sup>5</sup>   | DC_19A_n78A<br>DC_21A_n78A                |
| DC_19A-21A_n79A <sup>5</sup><br>DC_19A-21A_n79C <sup>5</sup>   | DC_19A_n79A<br>DC_21A_n79A                |
| DC_19A-21A_n77A <sup>5</sup><br>DC_19A-21A_n77C <sup>5</sup>   | DC_19A_n77A<br>DC_21A_n77A                |
| DC_19A-42A_n77A<br>DC_19A-42A_n77C<br>DC_19A-42C_n77A<br>DC_19A-42C_n77C   | DC_19A_n77A                               |
| DC_19A-42A_n78A<br>DC_19A-42A_n78C<br>DC_19A-42C_n78A<br>DC_19A-42C_n78C   | DC_19A_n78A                               |
| DC_19A-42A_n79A<br>DC_19A-42A_n79C<br>DC_19A-42C_n79A<br>DC_19A-42C_n79C   | DC_19A_n79A                               |
| DC_19A_n77A-n79A <sup>7</sup>  | DC_19A_n77A<br>DC_19A_n79A                |
| DC_19A_n78A-n79A <sup>8</sup>  | DC_19A_n78A<br>DC_19A_n79A                |
| DC_20A_n8A-n75A <sup>6</sup>   | DC_20A_n8A                                |
| DC_20A_n28A-n75A <sup>6</sup>  | DC_20A_n28A                               |
| DC_20A_n28A-n78A <sup>5,6</sup>  | DC_20A_n28A<br>DC_20A_n78A                |
| DC_20A_n75A-n78A <sup>5</sup>  | DC_20A_n78A                               |
| DC_20A_n76A-n78A <sup>5</sup>  | DC_20A_n78A                               |
| DC_20A_SUL_n78A-n82A <sup>5</sup>  | DC_20A_n78A<br>DC_20A_n82A_ULSUP-TDM_n78A |



| EN-DC configuration  | Uplink EN-DC configuration (NOTE 1)       |
|--|---|
| DC_20A_SUL_n78A-n83A <sup>5</sup>  | DC_20A_n78A<br>DC_20A_n83A                |
| DC_21A-28A_n77A<br>DC_21A-28A_n77C   | DC_21A_n77A<br>DC_28A_n77A                |
| DC_21A-28A_n78A<br>DC_21A-28A_n78C   | DC_21A_n78A<br>DC_28A_n78A                |
| DC_21A-28A_n79A<br>DC_21A-28A_n79C   | DC_21A_n79A<br>DC_28A_n79A                |
| DC_21A-42A_n77A<br>DC_21A-42A_n77C<br>DC_21A-42C_n77A<br>DC_21A-42C_n77C   | DC_21A_n77A                               |
| DC_21A-42A_n78A<br>DC_21A-42A_n78C<br>DC_21A-42C_n78A<br>DC_21A-42C_n78C   | DC_21A_n78A                               |
| DC_21A-42A_n79A<br>DC_21A-42A_n79C<br>DC_21A-42C_n79A<br>DC_21A-42C_n79C   | DC_21A_n79A                               |
| DC_21A_n77A-n79A <sup>7</sup>  | DC_21A_n77A<br>DC_21A_n79A                |
| DC_21A_n78A-n79A <sup>8</sup>  | DC_21A_n78A<br>DC_21A_n79A                |
| DC_28A-42A_n77A<br>DC_28A-42A_n77C<br>DC_28A-42C_n77A  | DC_28A_n77A                               |
| DC_28A-42A_n78A<br>DC_28A-42A_n78C<br>DC_28A-42C_n78A  | DC_28A_n78A                               |
| DC_28A-42A_n79A<br>DC_28A-42A_n79C<br>DC_28A-42C_n79A  | DC_28A_n79A                               |
| DC_28A_SUL_n78A-n83A <sup>5</sup>  | DC_28A_n78A, DC_28A_n83A_ULSUP-TDM_n78A,  |
| DC_41A-42A_n77A<br>DC_41A-42C_n77A<br>DC_41C-42A_n77A<br>DC_41C-42C_n77A   | DC_41A_n77A                               |
| DC_41A-42A_n78A<br>DC_41A-42C_n78A<br>DC_41C-42A_n78A<br>DC_41C-42C_n78A   | DC_41A_n78A                               |
| DC_41A-42A_n79A<br>DC_41A-42C_n79A<br>DC_41C-42A_n79A<br>DC_41C-42C_n79A   | DC_41A_n79A                               |
| DC_66A_(n)71AA   | DC_66A_n71A<br>DC_(n)71AA                 |
| DC_66A_SUL_n78A-n86A <sup>5</sup>  | DC_66A_n78A<br>DC_66A_n86A_ULSUP-TDM_n78A |
| <p>NOTE 1: Uplink EN-DC configurations are the configurations supported by the present release of specifications.</p> <p>NOTE 2: Only single switched UL is supported in Rel-15</p> <p>NOTE 3: Restricted to E-UTRA operation when inter-band carrier aggregation is configured. The downlink operating band for Band 46 is paired with the uplink operating band (external E-UTRA band) of the carrier aggregation configuration that is supporting the configured Pcell.</p> <p>NOTE 4: 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 can be up to 140us and placed in SUL resources.</p> <p>NOTE 5: Applicable for UE supporting inter-band EN-DC with mandatory simultaneous Rx/Tx capability</p> |   |

| EN-DC configuration  | Uplink EN-DC configuration (NOTE 1) |
|--|-------------------------------------|
| NOTE 6: 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.  |                                     |
| NOTE 7: 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 EN-DC configuration is part of a higher order configuration.                              |                                     |
| NOTE 8: 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 EN-DC configuration is part of a higher order configuration. |                                     |

5.5B.4.3 Inter-band EN-DC configurations within FR1 (four bands)

Table 5.5B.4.3-1: Inter-band EN-DC configurations within FR1 (four bands)

| EN-DC configuration  | Uplink EN-DC configuration (NOTE 1)     |
|--|---|
| DC_1A-3A-5A_n78A <sup>2</sup>                                    | DC_1A_n78A<br>DC_3A_n78A<br>DC_5A_n78A  |
| DC_1A-3A-7A_n28A   | DC_1A_n28A<br>DC_3A_n28A<br>DC_7A_n28A  |
| DC_1A-3A-7A_n78A <sup>2</sup><br>DC_1A-3C-7A_n78A <sup>2</sup>   | DC_1A_n78A<br>DC_3A_n78A<br>DC_7A_n78A  |
| DC_1A-3A-7A-7A_n78A <sup>2</sup>                                 | DC_1A_n78A<br>DC_3A_n78A<br>DC_7A_n78A  |
| DC_1A-3A-8A_n78A <sup>2</sup>                                    | DC_1A_n78A<br>DC_3A_n78A<br>DC_8A_n78A  |
| DC_1A-3A-19A_n77A <sup>2</sup><br>DC_1A-3A-19A_n77C <sup>2</sup> | DC_1A_n77A<br>DC_3A_n77A<br>DC_19A_n77A |
| DC_1A-3A-19A_n78A <sup>2</sup><br>DC_1A-3A-19A_n78C <sup>2</sup> | DC_1A_n78A<br>DC_3A_n78A<br>DC_19A_n78A |
| DC_1A-3A-19A_n79A <sup>2</sup><br>DC_1A-3A-19A_n79C <sup>2</sup> | DC_1A_n79A<br>DC_3A_n79A<br>DC_19A_n79A |
| DC_1A-3A-20A_n28A <sup>3</sup>                                   | DC_1A_n28A<br>DC_3A_n28A<br>DC_20A_n28A |
| DC_1A-3A-20A_n78A <sup>2</sup>                                   | DC_1A_n78A<br>DC_3A_n78A<br>DC_20A_n78A |
| DC_1A-3A-21A_n77A <sup>2</sup><br>DC_1A-3A-21A_n77C <sup>2</sup> | DC_1A_n77A<br>DC_3A_n77A<br>DC_21A_n77A |
| DC_1A-3A-21A_n78A <sup>2</sup><br>DC_1A-3A-21A_n78C <sup>2</sup> | DC_1A_n78A<br>DC_3A_n78A<br>DC_21A_n78A |
| DC_1A-3A-21A_n79A <sup>2</sup><br>DC_1A-3A-21A_n79C <sup>2</sup> | DC_1A_n79A<br>DC_3A_n79A<br>DC_21A_n79A |
| DC_1A-3A-28A_n77A <sup>2</sup>                                   | DC_1A_n77A<br>DC_3A_n77A<br>DC_28A_n77A |
| DC_1A-3A-28A_n78A <sup>2</sup>                                   | DC_1A_n78A<br>DC_3A_n78A<br>DC_28A_n78A |

| EN-DC configuration  | Uplink EN-DC configuration (NOTE 1)                  |
|--|--|
| DC_1A-3A-28A_n79A <sup>2</sup>   | DC_1A_n79A<br>DC_3A_n79A<br>DC_28A_n79A              |
| DC_1A-3A_n28A-n78A <sup>2</sup>  | DC_1A_n28A<br>DC_1A_n78A<br>DC_3A_n28A<br>DC_3A_n78A |
| DC_1A-3A-42A_n77A<br>DC_1A-3A-42A_n77C<br>DC_1A-3A-42C_n77A<br>DC_1A-3A-42C_n77C     | DC_1A_n77A<br>DC_3A_n77A                             |
| DC_1A-3A-42A_n78A<br>DC_1A-3A-42A_n78C<br>DC_1A-3A-42C_n78A<br>DC_1A-3A-42C_n78C     | DC_1A_n78A<br>DC_3A_n78A                             |
| DC_1A-3A-42A_n79A<br>DC_1A-3A-42A_n79C<br>DC_1A-3A-42C_n79A<br>DC_1A-3A-42C_n79C     | DC_1A_n79A<br>DC_3A_n79A                             |
| DC_1A-5A-7A_n78A   | DC_1A_n78A<br>DC_5A_n78A<br>DC_7A_n78A               |
| DC_1A-5A-7A-7A_n78A  | DC_1A_n78A<br>DC_5A_n78A<br>DC_7A_n78A               |
| DC_1A-7A-20A_n28A <sup>3</sup>   | DC_1A_n28A<br>DC_7A_n28A<br>DC_20A_n28A              |
| DC_1A-7A-20A_n78A <sup>2</sup>   | DC_1A_n78A<br>DC_7A_n78A<br>DC_20A_n78A              |
| DC_1A-7A_n28A-n78A <sup>2</sup>  | DC_1A_n28A<br>DC_1A_n78A<br>DC_7A_n28A<br>DC_7A_n78A |
| DC_1A-18A-28A_n77A   | DC_1A_n77A<br>DC_18A_n77A<br>DC_28A_n77A             |
| DC_1A-18A-28A_n78A   | DC_1A_n78A<br>DC_18A_n78A<br>DC_28A_n78A             |
| DC_1A-18A-28A_n79A <sup>2</sup>  | DC_1A_n79A<br>DC_18A_n79A<br>DC_28A_n79A             |
| DC_1A-19A-21A_n77A<br>DC_1A-19A-21A_n77C   | DC_1A_n77A<br>DC_19A_n77A<br>DC_21A_n77A             |
| DC_1A-19A-21A_n78A<br>DC_1A-19A-21A_n78C   | DC_1A_n78A<br>DC_19A_n78A<br>DC_21A_n78A             |
| DC_1A-19A-21A_n79A<br>DC_1A-19A-21A_n79C   | DC_1A_n79A<br>DC_19A_n79A<br>DC_21A_n79A             |
| DC_1A-19A-42A_n77A<br>DC_1A-19A-42A_n77C<br>DC_1A-19A-42C_n77A<br>DC_1A-19A-42C_n77C | DC_1A_n77A<br>DC_19A_n77A                            |
| DC_1A-19A-42A_n78A<br>DC_1A-19A-42A_n78C<br>DC_1A-19A-42C_n78A<br>DC_1A-19A-42C_n78C | DC_1A_n78A<br>DC_19A_n78A                            |
| DC_1A-19A-42A_n79A<br>DC_1A-19A-42A_n79C<br>DC_1A-19A-42C_n79A<br>DC_1A-19A-42C_n79C | DC_1A_n79A<br>DC_19A_n79A                            |

| EN-DC configuration  | Uplink EN-DC configuration (NOTE 1)                    |
|--|--|
| DC_1A-20A_n28A-n78A <sup>2,3</sup>   | DC_1A_n28A<br>DC_1A_n78A<br>DC_20A_n28A<br>DC_20A_n78A |
| DC_1A-21A-28A_n77A <sup>2</sup>  | DC_1A_n77A<br>DC_21A_n77A<br>DC_28A_n77A               |
| DC_1A-21A-28A_n78A <sup>2</sup>  | DC_1A_n78A<br>DC_21A_n78A<br>DC_28A_n78A               |
| DC_1A-21A-28A_n79A <sup>2</sup>  | DC_1A_n79A<br>DC_21A_n79A<br>DC_28A_n79A               |
| DC_1A-21A-42A_n77A<br>DC_1A-21A-42A_n77C<br>DC_1A-21A-42C_n77A<br>DC_1A-21A-42C_n77C | DC_1A_n77A<br>DC_21A_n77A                              |
| DC_1A-21A-42A_n78A<br>DC_1A-21A-42A_n78C<br>DC_1A-21A-42C_n78A<br>DC_1A-21A-42C_n78C | DC_1A_n78A<br>DC_21A_n78A                              |
| DC_1A-21A-42A_n79A<br>DC_1A-21A-42A_n79C<br>DC_1A-21A-42C_n79A<br>DC_1A-21A-42C_n79C | DC_1A_n79A<br>DC_21A_n79A                              |
| DC_1A-28A-42A_n77A<br>DC_1A-28A-42C_n77A   | DC_1A_n77A<br>DC_28A_n77A                              |
| DC_1A-28A-42A_n78A<br>DC_1A-28A-42C_n78A   | DC_1A_n78A<br>DC_28A_n78A                              |
| DC_1A-28A-42A_n79A<br>DC_1A-28A-42C_n79A   | DC_1A_n79A<br>DC_28A_n79A                              |
| DC_1A-41A-42A_n77A<br>DC_1A-41A-42C_n77A<br>DC_1A-41C-42A_n77A<br>DC_1A-41C-42C_n77A | DC_1A_n77A<br>DC_41A_n77A                              |
| DC_1A-41A-42A_n78A<br>DC_1A-41A-42C_n78A<br>DC_1A-41C-42A_n78A<br>DC_1A-41C-42C_n78A | DC_1A_n78A<br>DC_41A_n78A                              |
| DC_1A-41A-42A_n79A<br>DC_1A-41A-42C_n79A<br>DC_1A-41C-42A_n79A<br>DC_1A-41C-42C_n79A | DC_1A_n79A<br>DC_41A_n79A                              |
| DC_2A-66A-(n)71AA  | DC_2A_n71A<br>DC_66A_n71A<br>DC_(n)71AA                |
| DC_3A-5A-7A_n78A   | DC_3A_n78A<br>DC_5A_n78A<br>DC_7A_n78A                 |
| DC_3A-5A-7A-7A_n78A  | DC_3A_n78A<br>DC_5A_n78A<br>DC_7A_n78A                 |
| DC_3A-7A-20A_n28A <sup>3</sup>   | DC_3A_n28A<br>DC_7A_n28A<br>DC_20A_n28A                |
| DC_3A-7A-20A_n78A <sup>2</sup>   | DC_3A_n78A<br>DC_20A_n78A<br>DC_7A_n78A                |
| DC_3A-7A-28A_n78A <sup>2</sup><br>DC_3A-7C-28A_n78A <sup>2</sup>                     | DC_3A_n78A<br>DC_7A_n78A<br>DC_28A_n78A                |
| DC_3A-7A_n28A-n78A <sup>2</sup>  | DC_3A_n28A<br>DC_3A_n78A<br>DC_7A_n28A                 |

| EN-DC configuration  | Uplink EN-DC configuration (NOTE 1)                    |
|--|--|
|  | DC_7A_n78A   |
| DC_3A-19A-21A_n77A <sup>2</sup><br>DC_3A-19A-21A_n77C <sup>2</sup>   | DC_3A_n77A<br>DC_19A_n77A<br>DC_21A_n77A               |
| DC_3A-19A-21A_n78A <sup>2</sup><br>DC_3A-19A-21A_n78C <sup>2</sup>   | DC_3A_n78A<br>DC_19A_n78A<br>DC_21A_n78A               |
| DC_3A-19A-21A_n79A <sup>2</sup><br>DC_3A-19A-21A_n79C <sup>2</sup>   | DC_3A_n79A<br>DC_19A_n79A<br>DC_21A_n79A               |
| DC_3A-19A-42A_n77A<br>DC_3A-19A-42A_n77C<br>DC_3A-19A-42C_n77A<br>DC_3A-19A-42C_n77C   | DC_3A_n77A<br>DC_19A_n77A                              |
| DC_3A-19A-42A_n78A<br>DC_3A-19A-42A_n78C<br>DC_3A-19A-42C_n78A<br>DC_3A-19A-42C_n78C   | DC_3A_n78A<br>DC_19A_n78A                              |
| DC_3A-19A-42A_n79A <sup>2</sup><br>DC_3A-19A-42A_n79C <sup>2</sup><br>DC_3A-19A-42C_n79A <sup>2</sup><br>DC_3A-19A-42C_n79C <sup>2</sup> | DC_3A_n79A<br>DC_19A_n79A                              |
| DC_3A-20A_n28A-n78A <sup>2,3</sup>   | DC_3A_n28A<br>DC_3A_n78A<br>DC_20A_n28A<br>DC_20A_n78A |
| DC_3A-21A-42A_n77A<br>DC_3A-21A-42A_n77C<br>DC_3A-21A-42C_n77A<br>DC_3A-21A-42C_n77C   | DC_3A_n77A<br>DC_21A_n77A                              |
| DC_3A-21A-42A_n78A<br>DC_3A-21A-42A_n78C<br>DC_3A-21A-42C_n78A<br>DC_3A-21A-42C_n78C   | DC_3A_n78A<br>DC_21A_n78A                              |
| DC_3A-21A-42A_n79A<br>DC_3A-21A-42A_n79C<br>DC_3A-21A-42C_n79A<br>DC_3A-21A-42C_n79C   | DC_3A_n79A<br>DC_21A_n79A                              |
| DC_3A-28A-42A_n77A<br>DC_3A-28A-42C_n77A   | DC_3A_n77A<br>DC_28A_n77A                              |
| DC_3A-28A-42A_n78A<br>DC_3A-28A-42C_n78A   | DC_3A_n78A<br>DC_28A_n78A                              |
| DC_3A-28A-42A_n79A<br>DC_3A-28A-42C_n79A   | DC_3A_n79A<br>DC_28A_n79A                              |
| DC_7A-20A_n28A-n78A <sup>2,3</sup>   | DC_7A_n28A<br>DC_7A_n78A<br>DC_20A_n28A<br>DC_20A_n78A |
| DC_19A-21A-42A_n77A<br>DC_19A-21A-42A_n77C<br>DC_19A-21A-42C_n77A<br>DC_19A-21A-42C_n77C   | DC_19A_n77A<br>DC_21A_n77A                             |
| DC_19A-21A-42A_n78A<br>DC_19A-21A-42A_n78C<br>DC_19A-21A-42C_n78A<br>DC_19A-21A-42C_n78C   | DC_19A_n78A<br>DC_21A_n78A                             |
| DC_19A-21A-42A_n79A<br>DC_19A-21A-42A_n79C<br>DC_19A-21A-42C_n79A<br>DC_19A-21A-42C_n79C   | DC_19A_n79A<br>DC_21A_n79A                             |
| DC_21A-28A-42A_n77A<br>DC_21A-28A-42C_n77A   | DC_21A_n77A<br>DC_28A_n77A                             |
| DC_21A-28A-42A_n78A<br>DC_21A-28A-42C_n78A   | DC_21A_n78A<br>DC_28A_n78A                             |

| EN-DC configuration   | Uplink EN-DC configuration (NOTE 1) |
|---|-------------------------------------|
| DC_21A-28A-42A_n79A<br>DC_21A-28A-42C_n79A  | DC_21A_n79A<br>DC_28A_n79A          |
| NOTE 1: Uplink EN-DC configurations are the configurations supported by the present release of specifications.<br>NOTE 2: Applicable for UE supporting inter-band EN-DC with mandatory simultaneous Rx/Tx capability<br>NOTE 3: 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. |                                     |

5.5B.4.4 Inter-band EN-DC configurations within FR1 (five bands)

Table 5.5B.4.4-1: Inter-band EN-DC configurations within FR1 (five bands)

| EN-DC configuration  | Uplink EN-DC configuration (NOTE 1)  |
|--|--|
| DC_1A-3A-5A-7A_n78A  | DC_1A_n78A<br>DC_3A_n78A<br>DC_5A_n78A<br>DC_7A_n78A                             |
| DC_1A-3A-5A-7A-7A_n78A   | DC_1A_n78A<br>DC_3A_n78A<br>DC_5A_n78A<br>DC_7A_n78A                             |
| DC_1A-3A-7A-20A_n28A <sup>3</sup>  | DC_1A_n28A<br>DC_3A_n28A<br>DC_7A_n28A<br>DC_20A_n28A                            |
| DC_1A-3A-7A-20A_n78A <sup>2</sup>  | DC_1A_n78A<br>DC_3A_n78A<br>DC_7A_n78A<br>DC_20A_n78A                            |
| DC_1A-3A-7A_n28A-n78A <sup>2</sup>   | DC_1A_n28A<br>DC_1A_n78A<br>DC_3A_n28A<br>DC_3A_n78A<br>DC_7A_n28A<br>DC_7A_n78A |
| DC_1A-3A-19A-21A_n77A <sup>2</sup><br>DC_1A-3A-19A-21A_n77C <sup>2</sup>                         | DC_1A_n77A<br>DC_3A_n77A<br>DC_19A_n77A<br>DC_21A_n77A                           |
| DC_1A-3A-19A-21A_n78A <sup>2</sup><br>DC_1A-3A-19A-21A_n78C <sup>2</sup>                         | DC_1A_n78A<br>DC_3A_n78A<br>DC_19A_n78A<br>DC_21A_n78A                           |
| DC_1A-3A-19A-21A_n79A <sup>2</sup><br>DC_1A-3A-19A-21A_n79C <sup>2</sup>                         | DC_1A_n79A<br>DC_3A_n79A<br>DC_19A_n79A<br>DC_21A_n79A                           |
| DC_1A-3A-19A-42A_n77A<br>DC_1A-3A-19A-42A_n77C<br>DC_1A-3A-19A-42C_n77A<br>DC_1A-3A-19A-42C_n77C | DC_1A_n77A<br>DC_3A_n77A<br>DC_19A_n77A  |
| DC_1A-3A-19A-42A_n78A<br>DC_1A-3A-19A-42A_n78C<br>DC_1A-3A-19A-42C_n78A<br>DC_1A-3A-19A-42C_n78C | DC_1A_n78A<br>DC_3A_n78A<br>DC_19A_n78A  |
| DC_1A-3A-19A-42A_n79A<br>DC_1A-3A-19A-42A_n79C<br>DC_1A-3A-19A-42C_n79A<br>DC_1A-3A-19A-42C_n79C | DC_1A_n79A<br>DC_3A_n79A<br>DC_19A_n79A  |

| EN-DC configuration   | Uplink EN-DC configuration (NOTE 1)  |
|---|--|
| DC_1A-3A-20A_n28A-n78A <sup>2,3</sup>   | DC_1A_n28A<br>DC_1A_n78A<br>DC_3A_n28A<br>DC_3A_n78A<br>DC_20A_n28A<br>DC_20A_n78A |
| DC_1A-3A-21A-42A_n77A<br>DC_1A-3A-21A-42A_n77C<br>DC_1A-3A-21A-42C_n77A<br>DC_1A-3A-21A-42C_n77C  | DC_1A_n77A<br>DC_3A_n77A<br>DC_21A_n77A  |
| DC_1A-3A-21A-42A_n78A<br>DC_1A-3A-21A-42A_n78C<br>DC_1A-3A-21A-42C_n78A<br>DC_1A-3A-21A-42C_n78C  | DC_1A_n78A<br>DC_3A_n78A<br>DC_21A_n78A  |
| DC_1A-3A-21A-42A_n79A<br>DC_1A-3A-21A-42A_n79C<br>DC_1A-3A-21A-42C_n79A<br>DC_1A-3A-21A-42C_n79C  | DC_1A_n79A<br>DC_3A_n79A<br>DC_21A_n79A  |
| DC_1A-3A-28A-42A_n77A<br>DC_1A-3A-28A-42C_n77A  | DC_1A_n77A<br>DC_3A_n77A<br>DC_28A_n77A  |
| DC_1A-3A-28A-42A_n78A<br>DC_1A-3A-28A-42C_n78A  | DC_1A_n78A<br>DC_3A_n78A<br>DC_28A_n78A  |
| DC_1A-3A-28A-42A_n79A<br>DC_1A-3A-28A-42C_n79A  | DC_1A_n79A<br>DC_3A_n79A<br>DC_28A_n79A  |
| DC_1A-7A-20A_n28A-n78A <sup>2,3</sup>   | DC_1A_n28A<br>DC_1A_n78A<br>DC_7A_n28A<br>DC_7A_n78A<br>DC_20A_n28A<br>DC_20A_n78A |
| DC_1A-19A-21A-42A_n77A<br>DC_1A-19A-21A-42A_n77C<br>DC_1A-19A-21A-42C_n77A<br>DC_1A-19A-21A-42C_n77C  | DC_1A_n77A<br>DC_19A_n77A<br>DC_21A_n77A   |
| DC_1A-19A-21A-42A_n78A<br>DC_1A-19A-21A-42A_n78C<br>DC_1A-19A-21A-42C_n78A<br>DC_1A-19A-21A-42C_n78C  | DC_1A_n78A<br>DC_19A_n78A<br>DC_21A_n78A   |
| DC_1A-19A-21A-42A_n79A<br>DC_1A-19A-21A-42A_n79C<br>DC_1A-19A-21A-42C_n79A<br>DC_1A-19A-21A-42C_n79C  | DC_1A_n79A<br>DC_19A_n79A<br>DC_21A_n79A   |
| DC_1A-21A-28A-42A_n77A<br>DC_1A-21A-28A-42C_n77A  | DC_1A_n77A<br>DC_21A_n77A<br>DC_28A_n77A   |
| DC_1A-21A-28A-42A_n78A<br>DC_1A-21A-28A-42C_n78A  | DC_1A_n78A<br>DC_21A_n78A<br>DC_28A_n78A   |
| DC_1A-21A-28A-42A_n79A<br>DC_1A-21A-28A-42C_n79A  | DC_1A_n79A<br>DC_21A_n79A<br>DC_28A_n79A   |
| DC_3A-7A-20A_n28A-n78A <sup>2,3</sup>   | DC_3A_n28A<br>DC_3A_n78A<br>DC_7A_n28A<br>DC_7A_n78A<br>DC_20A_n28A<br>DC_20A_n78A |
| <p>NOTE 1: Uplink EN-DC configurations are the configurations supported by the present release of specifications.</p> <p>NOTE 2: Applicable for UE supporting inter-band EN-DC with mandatory simultaneous Rx/Tx capability</p> |  |

| EN-DC configuration  | Uplink EN-DC configuration (NOTE 1) |
|--|-------------------------------------|
| NOTE 3: 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 |                                     |

5.5B.4.5 Inter-band EN-DC configurations within FR1 (six bands)

Table 5.5B.4.5-1: Inter-band EN-DC configurations within FR1 (six bands)

| EN-DC configuration  | Uplink EN-DC configuration (NOTE 1)  |
|--|--|
| DC_1A-3A-7A-20A_n28A-n78A <sup>2,3</sup>   | DC_1A_n28A<br>DC_1A_n78A<br>DC_3A_n28A<br>DC_3A_n78A<br>DC_7A_n28A<br>DC_7A_n78A<br>DC_20A_n28A<br>DC_20A_n78A |
| NOTE 1: Uplink EN-DC configurations are the configurations supported by the present release of specifications.<br>NOTE 2: Applicable for UE supporting inter-band EN-DC with mandatory simultaneous Rx/Tx capability<br>NOTE 3: 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 |  |

5.5B.4a Inter-band NE-DC within FR1

5.5B.4a.1 Inter-band NE-DC configurations within FR1 (two bands)

Table 5.5B.4a.1-1: Inter-band NE-DC configurations within FR1 (two bands)

| NE-DC configuration  | Uplink NE-DC configuration (NOTE 1) | Single UL allowed |
|--|-------------------------------------|-------------------|
| DC_n1A_28A   | DC_n1A_28A                          | No                |
| NOTE 1: Uplink NE-DC configurations are the configurations supported by the present release of specifications. |                                     |                   |

5.5B.5 Inter-band EN-DC including FR2

5.5B.5.1 Inter-band EN-DC configurations including FR2 (two bands)

Table 5.5B.5.1-1: Inter-band EN-DC configurations including FR2 (two bands)

| EN-DC configuration                                      | Uplink EN-DC configuration (NOTE 1) |
|--|-------------------------------------|
| DC_1A_n257A<br>DC_1A_n257D<br>DC_1A_n257E<br>DC_1A_n257F | DC_1A_n257A                         |
| DC_2A_n257A<br>DC_2C_n257A                               | DC_2A_n257A                         |
| DC_2A_n257(2A)   | DC_2A_n257A                         |
| DC_2A-2A_n257A   | DC_2A_n257A                         |



| EN-DC configuration   | Uplink EN-DC configuration (NOTE 1) |
|---|-------------------------------------|
| DC_2A_n260A<br>DC_2A_n260G<br>DC_2A_n260H<br>DC_2A_n260I<br>DC_2A_n260J<br>DC_2A_n260K<br>DC_2A_n260L<br>DC_2A_n260M<br>DC_2C_n260A   | DC_2A_n260A                         |
| DC_2A_n260(2A)  | DC_2A_n260                          |
| DC_2A-2A_n260A<br>DC_2A-2A_n260G<br>DC_2A-2A_n260H<br>DC_2A-2A_n260I<br>DC_2A-2A_n260J<br>DC_2A-2A_n260K<br>DC_2A-2A_n260L<br>DC_2A-2A_n260M  | DC_2A_n260A                         |
| DC_3A_n257A<br>DC_3A_n257D<br>DC_3A_n257E<br>DC_3A_n257F  | DC_3A_n257A                         |
| DC_3A_n258A   | DC_3A_n258A                         |
| DC_5A_n257A<br>DC_5B_n257A  | DC_5A_n257A<br>DC_5B_n257A          |
| DC_5A-5A_n257A  | DC_5A_n257A                         |
| DC_5A_n260A<br>DC_5A_n260B<br>DC_5A_n260C<br>DC_5A_n260D<br>DC_5A_n260E<br>DC_5A_n260F<br>DC_5A_n260G<br>DC_5A_n260H<br>DC_5A_n260I<br>DC_5A_n260J<br>DC_5A_n260K<br>DC_5A_n260L<br>DC_5A_n260M<br>DC_5A_n260O<br>DC_5A_n260P<br>DC_5A_n260Q<br>DC_5B_n260A         | DC_5A_n260A<br>DC_5B_n260A          |
| DC_5A_n260(2A)<br>DC_5A_n260(3A)<br>DC_5A_n260(4A)<br>DC_5A_n260(A-I)<br>DC_5A_n260(D-G)<br>DC_5A_n260(D-H)<br>DC_5A_n260(D-I)<br>DC_5A_n260(D-O)<br>DC_5A_n260(D-P)<br>DC_5A_n260(D-Q)<br>DC_5A_n260(E-O)<br>DC_5A_n260(E-P)<br>DC_5A_n260(E-Q)<br>DC_5A_n260(G-I) | DC_5A_n260A                         |
| DC_5A-5A_n260A  | DC_5A_n260A                         |
| DC_5A_n261A<br>DC_5A_n261B<br>DC_5A_n261C<br>DC_5A_n261D<br>DC_5A_n261E   | DC_5A_n261A                         |

| EN-DC configuration   | Uplink EN-DC configuration (NOTE 1) |
|---|-------------------------------------|
| DC_5A_n261F<br>DC_5A_n261G<br>DC_5A_n261H<br>DC_5A_n261I<br>DC_5A_n261J<br>DC_5A_n261K<br>DC_5A_n261L<br>DC_5A_n261M<br>DC_5A_n261O<br>DC_5A_n261P<br>DC_5A_n261Q   |                                     |
| DC_5A_n261(2A)<br>DC_5A_n261(3A)<br>DC_5A_n261(4A)<br>DC_5A_n261(D-G)<br>DC_5A_n261(D-H)<br>DC_5A_n261(D-I)<br>DC_5A_n261(D-O)<br>DC_5A_n261(D-P)<br>DC_5A_n261(D-Q)<br>DC_5A_n261(E-O)<br>DC_5A_n261(E-P)<br>DC_5A_n261(E-Q) | DC_5A_n261A                         |
| DC_7A_n257A   | DC_7A_n257A                         |
| DC_7A-7A_n257A  | DC_7A_n257A                         |
| DC_7A_n258A   | DC_7A_n258A                         |
| DC_8A_n257A   | DC_8A_n257A                         |
| DC_8A_n258A   | DC_8A_n258A                         |
| DC_11A_n257A  | DC_11A_n257A                        |
| DC_12A_n260A<br>DC_12A_n260G<br>DC_12A_n260H<br>DC_12A_n260I<br>DC_12A_n260J<br>DC_12A_n260K<br>DC_12A_n260L<br>DC_12A_n260M  | DC_12A_n260A                        |
| DC_12A_n260(A-I)<br>DC_12A_n260(G-I)  | DC_12A_n260A                        |
| DC_13A_n257A  | DC_13A_n257A                        |
| DC_13A_n260A  | DC_13A_n260A                        |
| DC_18A_n257A  | DC_18A_n257A                        |
| DC_19A_n257A<br>DC_19A_n257D<br>DC_19A_n257E<br>DC_19A_n257F  | DC_19A_n257A                        |
| DC_20A_n258A  | DC_20A_n258A                        |
| DC_21A_n257A<br>DC_21A_n257D<br>DC_21A_n257E<br>DC_21A_n257F  | DC_21A_n257A                        |
| DC_26A_n257A  | DC_26A_n257A                        |
| DC_28A_n257A<br>DC_28A_n257D<br>DC_28A_n257E<br>DC_28A_n257F  | DC_28A_n257A                        |
| DC_28A_n258A  | DC_28A_n258A                        |
| DC_30A_n260A<br>DC_30A_n260G<br>DC_30A_n260H  | DC_30A_n260A                        |

| EN-DC configuration  | Uplink EN-DC configuration (NOTE 1) |
|--|-------------------------------------|
| DC_30A_n260I<br>DC_30A_n260J<br>DC_30A_n260K<br>DC_30A_n260L<br>DC_30A_n260M   |                                     |
| DC_30A_n260(A-I)<br>DC_30A_n260(G-I)   | DC_30A_n260A                        |
| DC_39A_n258A   | DC_39A_n258A                        |
| DC_41A_n257A<br>DC_41C_n257A   | DC_41A_n257A<br>DC_41C_n257A        |
| DC_41A_n258A   | DC_41A_n258A                        |
| DC_42A_n257A<br>DC_42C_n257A<br>DC_42A_n257D<br>DC_42A_n257E<br>DC_42A_n257F<br>DC_42C_n257D<br>DC_42C_n257E<br>DC_42C_n257F<br>DC_42D_n257A<br>DC_42E_n257A   | DC_42A_n257A<br>DC_42C_n257A        |
| DC_48A_n257A<br>DC_48C_n257A   | DC_48A_n257A<br>DC_48C_n257A        |
| DC_48A-48A_n257A   | DC_48A_n257A                        |
| DC_48A_n260A<br>DC_48C_n260A   | DC_48A_n260A<br>DC_48C_n260A        |
| DC_48A-48A_n260A   | DC_48A_n260A                        |
| DC_66A_n257A<br>DC_66A_n257G<br>DC_66A_n257H<br>DC_66A_n257I<br>DC_66A_n257J<br>DC_66A_n257K<br>DC_66A_n257L<br>DC_66A_n257M<br>DC_66C_n257A   | DC_66A_n257A                        |
| DC_66A_n257(2A)  | DC_66A_n257A                        |
| DC_66A-66A_n257A   | DC_66A_n257A                        |
| DC_66A_n260A<br>DC_66A_n260D<br>DC_66A_n260E<br>DC_66A_n260F<br>DC_66A_n260G<br>DC_66A_n260H<br>DC_66A_n260I<br>DC_66A_n260J<br>DC_66A_n260K<br>DC_66A_n260L<br>DC_66A_n260M<br>DC_66A_n260O<br>DC_66A_n260P<br>DC_66A_n260Q | DC_66A_n260A                        |
| DC_66A_n260(2A)<br>DC_66A_n260(3A)<br>DC_66A_n260(4A)<br>DC_66A_n260(A-I)<br>DC_66A_n260(D-G)<br>DC_66A_n260(D-H)<br>DC_66A_n260(D-I)<br>DC_66A_n260(D-O)<br>DC_66A_n260(D-P)<br>DC_66A_n260(D-Q)                            | DC_66A_n260A                        |

| EN-DC configuration  | Uplink EN-DC configuration (NOTE 1) |
|--|-------------------------------------|
| DC_66A_n260(E-O)<br>DC_66A_n260(E-P)<br>DC_66A_n260(E-Q)<br>DC_66A_n260(G-I)   |                                     |
| DC_66A-66A_n260A<br>DC_66A-66A_n260G<br>DC_66A-66A_n260H<br>DC_66A-66A_n260I<br>DC_66A-66A_n260J<br>DC_66A-66A_n260K<br>DC_66A-66A_n260L<br>DC_66A-66A_n260M   | DC_66A_n260A                        |
| DC_66A_n261A<br>DC_66A_n261D<br>DC_66A_n261E<br>DC_66A_n261F<br>DC_66A_n261G<br>DC_66A_n261H<br>DC_66A_n261I<br>DC_66A_n261J<br>DC_66A_n261K<br>DC_66A_n261L<br>DC_66A_n261M<br>DC_66A_n261O<br>DC_66A_n261P<br>DC_66A_n261Q                           | DC_66A_n261A                        |
| DC_66A_n261(2A)<br>DC_66A_n261(3A)<br>DC_66A_n261(4A)<br>DC_66A_n261(D-G)<br>DC_66A_n261(D-H)<br>DC_66A_n261(D-I)<br>DC_66A_n261(D-O)<br>DC_66A_n261(D-P)<br>DC_66A_n261(D-Q)<br>DC_66A_n261(E-O)<br>DC_66A_n261(E-P)<br>DC_66A_n261(E-Q)              | DC_66A_n261A                        |
| NOTE 1: Uplink EN-DC configurations are the configurations supported by the present release of specifications.<br>NOTE 2: Applicable for UE supporting inter-band EN-DC with mandatory simultaneous Rx/Tx capability for all of the above combinations |                                     |

5.5B.5.2 Inter-band EN-DC configurations including FR2 (three bands)

Table 5.5B.5.2-1: Inter-band EN-DC configurations including FR2 (three bands)

| EN-DC configuration  | Uplink EN-DC configuration (NOTE 1) |
|--|-------------------------------------|
| DC_1A-3A_n257A <sup>2</sup><br>DC_1A-3A_n257D <sup>2</sup><br>DC_1A-3A_n257E <sup>2</sup><br>DC_1A-3A_n257F <sup>2</sup> | DC_1A_n257A<br>DC_3A_n257A          |
| DC_1A-5A_n257A <sup>2</sup>  | DC_1A_n257A<br>DC_5A_n257A          |
| DC_1A-7A_n257A <sup>2</sup>  | DC_1A_n257A<br>DC_7A_n257A          |
| DC_1A-7A-7A_n257A <sup>2</sup>   | DC_1A_n257A<br>DC_7A_n257A          |
| DC_1A-8A_n257A <sup>2</sup>  | DC_1A_n257A<br>DC_8A_n257A          |
| DC_1A-18A_n257A <sup>2</sup>   | DC_1A_n257A                         |

| EN-DC configuration  | Uplink EN-DC configuration (NOTE 1)         |
|--|---|
|  | DC_18A_n257A                                |
| DC_1A-19A_n257A <sup>2</sup><br>DC_1A-19A_n257D <sup>2</sup><br>DC_1A-19A_n257E <sup>2</sup><br>DC_1A-19A_n257F <sup>2</sup>   | DC_1A_n257A<br>DC_19A_n257A                 |
| DC_1A-21A_n257A <sup>2</sup><br>DC_1A-21A_n257D <sup>2</sup><br>DC_1A-21A_n257E <sup>2</sup><br>DC_1A-21A_n257F <sup>2</sup>   | DC_1A_n257A<br>DC_21A_n257A                 |
| DC_1A-28A_n257A <sup>2</sup><br>DC_1A-28A_n257D <sup>2</sup><br>DC_1A-28A_n257E <sup>2</sup><br>DC_1A-28A_n257F <sup>2</sup>   | DC_1A_n257A<br>DC_28A_n257A                 |
| DC_1A-41A_n257A<br>DC_1A-41C_n257A   | DC_1A_n257A<br>DC_41A_n257A<br>DC_41C_n257A |
| DC_1A-42A_n257A<br>DC_1A-42A_n257D<br>DC_1A-42A_n257E<br>DC_1A-42A_n257F<br>DC_1A-42C_n257A<br>DC_1A-42C_n257D<br>DC_1A-42C_n257E<br>DC_1A-42C_n257F<br>DC_1A-42D_n257A<br>DC_1A-42E_n257A | DC_1A_n257A<br>DC_42A_n257A                 |
| DC_2A-5A_n257A <sup>2</sup>  | DC_2A_n257A<br>DC_5A_n257A                  |
| DC_2A-5A_n260A<br>DC_2A-5A_n260G<br>DC_2A-5A_n260H<br>DC_2A-5A_n260I<br>DC_2A-5A_n260J<br>DC_2A-5A_n260K<br>DC_2A-5A_n260L<br>DC_2A-5A_n260M   | DC_2A_n260A<br>DC_5A_n260A                  |
| DC_2A-12A_n260A<br>DC_2A-12A_n260G<br>DC_2A-12A_n260H<br>DC_2A-12A_n260I<br>DC_2A-12A_n260J<br>DC_2A-12A_n260K<br>DC_2A-12A_n260L<br>DC_2A-12A_n260M                                       | DC_2A_n260A<br>DC_12A_n260A                 |
| DC_2A-13A_n257A <sup>2</sup>   | DC_2A_n257A<br>DC_13A_n257A                 |
| DC_2A-13A_n260A <sup>2</sup>   | DC_2A_n260A<br>DC_13A_n260A                 |
| DC_2A-30A_n260A<br>DC_2A-30A_n260G<br>DC_2A-30A_n260H<br>DC_2A-30A_n260I<br>DC_2A-30A_n260J<br>DC_2A-30A_n260K<br>DC_2A-30A_n260L<br>DC_2A-30A_n260M                                       | DC_2A_n260A<br>DC_30A_n260A                 |
| DC_2A-66A_n257A <sup>2</sup>   | DC_2A_n257A<br>DC_66A_n257A                 |
| DC_2A-66A_n260A<br>DC_2A-66A_n260G<br>DC_2A-66A_n260H<br>DC_2A-66A_n260I<br>DC_2A-66A_n260J  | DC_2A_n260A<br>DC_66A_n260A                 |

| EN-DC configuration  | Uplink EN-DC configuration (NOTE 1) |
|--|-------------------------------------|
| DC_2A-66A_n260K<br>DC_2A-66A_n260L<br>DC_2A-66A_n260M  |                                     |
| DC_3A-5A_n257A <sup>2</sup>  | DC_3A_n257A<br>DC_5A_n257A          |
| DC_3A-7A_n257A <sup>2</sup>  | DC_3A_n257A<br>DC_7A_n257A          |
| DC_3A-7A-7A_n257A <sup>2</sup>   | DC_3A_n257A<br>DC_7A_n257A          |
| DC_3A-19A_n257A <sup>2</sup><br>DC_3A-19A_n257D <sup>2</sup><br>DC_3A-19A_n257E <sup>2</sup><br>DC_3A-19A_n257F <sup>2</sup>   | DC_3A_n257A<br>DC_19A_n257A         |
| DC_3A-21A_n257A <sup>2</sup><br>DC_3A-21A_n257D <sup>2</sup><br>DC_3A-21A_n257E <sup>2</sup><br>DC_3A-21A_n257F <sup>2</sup>   | DC_3A_n257A<br>DC_21A_n257A         |
| DC_3A-28A_n257A <sup>2</sup><br>DC_3A-28A_n257D <sup>2</sup><br>DC_3A-28A_n257E <sup>2</sup><br>DC_3A-28A_n257F <sup>2</sup>   | DC_3A_n257A<br>DC_28A_n257A         |
| DC_3A-41A_n257A  | DC_3A_n257A<br>DC_41A_n257A         |
| DC_3A-42A_n257A <sup>2</sup><br>DC_3A-42A_n257D <sup>2</sup><br>DC_3A-42A_n257E <sup>2</sup><br>DC_3A-42A_n257F <sup>2</sup><br>DC_3A-42C_n257A <sup>2</sup><br>DC_3A-42C_n257D <sup>2</sup><br>DC_3A-42C_n257E <sup>2</sup><br>DC_3A-42C_n257F <sup>2</sup><br>DC_3A-42D_n257A <sup>2</sup><br>DC_3A-42E_n257A <sup>2</sup> | DC_3A_n257A<br>DC_42A_n257A         |
| DC_5A-7A_n257A <sup>2</sup>  | DC_5A_n257A<br>DC_7A_n257A          |
| DC_5A-7A-7A_n257A  | DC_5A_n257A<br>DC_7A_n257A          |
| DC_5A-30A_n260A<br>DC_5A-30A_n260G<br>DC_5A-30A_n260H<br>DC_5A-30A_n260I<br>DC_5A-30A_n260J<br>DC_5A-30A_n260K<br>DC_5A-30A_n260L<br>DC_5A-30A_n260M   | DC_5A_n260A<br>DC_30A_n260A         |
| DC_5A-66A_n257A  | DC_5A_n257A<br>DC_66A_n257A         |
| DC_5A-66A_n260A<br>DC_5A-66A_n260G<br>DC_5A-66A_n260H<br>DC_5A-66A_n260I<br>DC_5A-66A_n260J<br>DC_5A-66A_n260K<br>DC_5A-66A_n260L<br>DC_5A-66A_n260M   | DC_5A_n260A<br>DC_66A_n260A         |
| DC_12A-30A_n260A<br>DC_12A-30A_n260G<br>DC_12A-30A_n260H<br>DC_12A-30A_n260I<br>DC_12A-30A_n260J<br>DC_12A-30A_n260K<br>DC_12A-30A_n260L   | DC_12A_n260A<br>DC_30A_n260A        |

| EN-DC configuration   | Uplink EN-DC configuration (NOTE 1) |
|---|-------------------------------------|
| DC_12A-30A_n260M  |                                     |
| DC_12A-66A_n260A<br>DC_12A-66A_n260G<br>DC_12A-66A_n260H<br>DC_12A-66A_n260I<br>DC_12A-66A_n260J<br>DC_12A-66A_n260K<br>DC_12A-66A_n260L<br>DC_12A-66A_n260M      | DC_12A_n260A<br>DC_66A_n260A        |
| DC_13A-66A_n257A <sup>2</sup>   | DC_13A_n257A<br>DC_66A_n257A        |
| DC_13A-66A_n260A <sup>2</sup>   | DC_13A_n260A<br>DC_66A_n260A        |
| DC_18A-28A_n257A <sup>2</sup>   | DC_18A_n257A<br>DC_28A_n257A        |
| DC_19A-21A_n257A <sup>2</sup><br>DC_19A-21A_n257D <sup>2</sup><br>DC_19A-21A_n257E <sup>2</sup><br>DC_19A-21A_n257F <sup>2</sup>                                  | DC_19A_n257A<br>DC_21A_n257A        |
| DC_19A-42A_n257A <sup>2</sup><br>DC_19A-42A_n257D <sup>2</sup><br>DC_19A-42A_n257E <sup>2</sup><br>DC_19A-42A_n257F <sup>2</sup><br>DC_19A-42C_n257A <sup>2</sup> | DC_19A_n257A<br>DC_42A_n257A        |
| DC_21A-28A_n257A <sup>2</sup><br>DC_21A-28A_n257D <sup>2</sup><br>DC_21A-28A_n257E <sup>2</sup><br>DC_21A-28A_n257F <sup>2</sup>                                  | DC_21A_n257A<br>DC_28A_n257A        |
| DC_21A-42A_n257A <sup>2</sup><br>DC_21A-42A_n257D <sup>2</sup><br>DC_21A-42A_n257E <sup>2</sup><br>DC_21A-42A_n257F <sup>2</sup><br>DC_21A-42C_n257A <sup>2</sup> | DC_21A_n257A<br>DC_42A_n257A        |
| DC_28A-42C_n257A <sup>2</sup><br>DC_28A-42A_n257A <sup>2</sup>  | DC_28A_n257A<br>DC_42A_n257A        |
| DC_30A-66A_n260A<br>DC_30A-66A_n260G<br>DC_30A-66A_n260H<br>DC_30A-66A_n260I<br>DC_30A-66A_n260J<br>DC_30A-66A_n260K<br>DC_30A-66A_n260L<br>DC_30A-66A_n260M      | DC_30A_n260A<br>DC_66A_n260A        |
| DC_41A-42A_n257A<br>DC_41A-42C_n257A<br>DC_41C-42A_n257A<br>DC_41C-42C_n257A  | DC_41A_n257A<br>DC_42A_n257A        |
| NOTE 1: Uplink EN-DC configurations are the configurations supported by the present release of specifications.  |                                     |
| NOTE 2: Applicable for UE supporting inter-band EN-DC with mandatory simultaneous Rx/Tx capability  |                                     |

5.5B.5.3 Inter-band EN-DC configurations including FR2 (four bands)

Table 5.5B.5.3-1: Inter-band EN-DC configurations including FR2 (four bands)

| EN-DC configuration            | Uplink EN-DC configuration (NOTE 1)       |
|--------------------------------|---|
| DC_1A-3A-5A_n257A <sup>2</sup> | DC_1A_n257A<br>DC_3A_n257A<br>DC_5A_n257A |

| EN-DC configuration   | Uplink EN-DC configuration (NOTE 1)         |
|---|---|
| DC_1A-3A-7A_n257A <sup>2</sup>  | DC_1A_n257A<br>DC_3A_n257A<br>DC_7A_n257A   |
| DC_1A-3A-7A-7A_n257A  | DC_1A_n257A<br>DC_3A_n257A<br>DC_7A_n257A   |
| DC_1A-3A-19A_n257A <sup>2</sup>   | DC_1A_n257A<br>DC_3A_n257A<br>DC_19A_n257A  |
| DC_1A-3A-21A_n257A <sup>2</sup>   | DC_1A_n257A<br>DC_3A_n257A<br>DC_21A_n257A  |
| DC_1A-3A-28A_n257A <sup>2</sup>   | DC_1A_n257A<br>DC_3A_n257A<br>DC_28A_n257A  |
| DC_1A-3A-42A_n257A<br>DC_1A-3A-42C_n257A<br>DC_1A-3A-42C_n257D<br>DC_1A-3A-42C_n257E<br>DC_1A-3A-42C_n257F      | DC_1A_n257A<br>DC_3A_n257A<br>DC_42A_n257A  |
| DC_1A-5A-7A_n257A <sup>2</sup>  | DC_1A_n257A<br>DC_5A_n257A<br>DC_7A_n257A   |
| DC_1A-5A-7A-7A_n257A  | DC_1A_n257A<br>DC_5A_n257A<br>DC_7A_n257A   |
| DC_1A-18A-28A_n257A <sup>2</sup>  | DC_1A_n257A<br>DC_18A_n257A<br>DC_28A_n257A |
| DC_1A-19A-21A_n257A<br>DC_1A-19A-21A_n257D<br>DC_1A-19A-21A_n257E<br>DC_1A-19A-21A_n257F                        | DC_1A_n257A<br>DC_19A_n257A<br>DC_21A_n257A |
| DC_1A-19A-42A_n257A<br>DC_1A-19A-42C_n257A<br>DC_1A-19A-42C_n257D<br>DC_1A-19A-42C_n257E<br>DC_1A-19A-42C_n257F | DC_1A_n257A<br>DC_19A_n257A<br>DC_42A_n257A |
| DC_1A-21A-28A_n257A <sup>2</sup>  | DC_1A_n257A<br>DC_21A_n257A<br>DC_28A_n257A |
| DC_1A-21A-42A_n257A<br>DC_1A-21A-42C_n257A<br>DC_1A-21A-42C_n257D<br>DC_1A-21A-42C_n257E<br>DC_1A-21A-42C_n257F | DC_1A_n257A<br>DC_21A_n257A<br>DC_42A_n257A |
| DC_1A-28A-42A_n257A<br>DC_1A-28A-42C_n257A  | DC_1A_n257A<br>DC_28A_n257A<br>DC_42A_n257A |
| DC_1A-41A-42A_n257A<br>DC_1A-41A-42C_n257A<br>DC_1A-41C-42A_n257A<br>DC_1A-41C-42C_n257A                        | DC_1A_n257A<br>DC_41A_n257A<br>DC_42A_n257A |
| DC_3A-5A-7A_n257A <sup>2</sup>  | DC_3A_n257A<br>DC_5A_n257A<br>DC_7A_n257A   |
| DC_3A-5A-7A-7A_n257A <sup>2</sup>   | DC_3A_n257A<br>DC_5A_n257A<br>DC_7A_n257A   |
| DC_3A-19A-21A_n257A <sup>2</sup>  | DC_3A_n257A<br>DC_19A_n257A                 |



| EN-DC configuration   | Uplink EN-DC configuration (NOTE 1)          |
|---|--|
|   | DC_21A_n257A                                 |
| DC_3A-19A-42A_n257A<br>DC_3A-19A-42C_n257A<br>DC_3A-19A-42C_n257D<br>DC_3A-19A-42C_n257E<br>DC_3A-19A-42C_n257F   | DC_3A_n257A<br>DC_19A_n257A<br>DC_42A_n257A  |
| DC_3A-21A-42A_n257A<br>DC_3A-21A-42C_n257A<br>DC_3A-21A-42C_n257D<br>DC_3A-21A-42C_n257E<br>DC_3A-21A-42C_n257F   | DC_3A_n257A<br>DC_21A_n257A<br>DC_42A_n257A  |
| DC_3A-28A-42A_n257A<br>DC_3A-28A-42C_n257A  | DC_3A_n257A<br>DC_28A_n257A<br>DC_42A_n257A  |
| DC_19A-21A-42A_n257A <sup>2</sup><br>DC_19A-21A-42C_n257A <sup>2</sup><br>DC_19A-21A-42C_n257D <sup>2</sup><br>DC_19A-21A-42C_n257E <sup>2</sup><br>DC_19A-21A-42C_n257F <sup>2</sup> | DC_19A_n257A<br>DC_21A_n257A<br>DC_42A_n257A |
| DC_21A-28A-42A_n257A <sup>2</sup><br>DC_21A-28A-42C_n257A <sup>2</sup>  | DC_21A_n257A<br>DC_28A_n257A<br>DC_42A_n257A |
| NOTE 1: Uplink EN-DC configurations are the configurations supported by the present release of specifications.  |  |
| NOTE 2: Applicable for UE supporting inter-band EN-DC with mandatory simultaneous Rx/Tx capability  |  |

5.5B.5.4 Inter-band EN-DC configurations including FR2 (five bands)

Table 5.5B.5.4-1: Inter-band EN-DC configurations including FR2 (five bands)

| EN-DC configuration  | Uplink EN-DC configuration (NOTE 1)                        |
|--|--|
| DC_1A-3A-5A-7A_n257A   | DC_1A_n257A<br>DC_3A_n257A<br>DC_5A_n257A<br>DC_7A_n257A   |
| DC_1A-3A-5A-7A-7A_n257A  | DC_1A_n257A<br>DC_3A_n257A<br>DC_5A_n257A<br>DC_7A_n257A   |
| DC_1A-3A-19A-21A_n257A<br>DC_1A-3A-19A-21A_n257D<br>DC_1A-3A-19A-21A_n257E<br>DC_1A-3A-19A-21A_n257F   | DC_1A_n257A<br>DC_3A_n257A<br>DC_19A_n257A<br>DC_21A_n257A |
| DC_1A-3A-19A-42A_n257A<br>DC_1A-3A-19A-42A_n257D<br>DC_1A-3A-19A-42A_n257E<br>DC_1A-3A-19A-42A_n257F<br>DC_1A-3A-19A-42C_n257A<br>DC_1A-3A-19A-42C_n257D<br>DC_1A-3A-19A-42C_n257E<br>DC_1A-3A-19A-42C_n257F | DC_1A_n257A<br>DC_3A_n257A<br>DC_19A_n257A<br>DC_42A_n257A |
| DC_1A-3A-21A-42A_n257A<br>DC_1A-3A-21A-42C_n257A<br>DC_1A-3A-21A-42C_n257D<br>DC_1A-3A-21A-42C_n257E<br>DC_1A-3A-21A-42C_n257F   | DC_1A_n257A<br>DC_3A_n257A<br>DC_21A_n257A<br>DC_42A_n257A |
| DC_1A-3A-28A-42A_n257A<br>DC_1A-3A-28A-42C_n257A   | DC_1A_n257A<br>DC_3A_n257A<br>DC_28A_n257A                 |

| EN-DC configuration  | Uplink EN-DC configuration (NOTE 1)                         |
|--|---|
|  | DC_42A_n257A  |
| DC_1A-19A-21A-42A_n257A<br>DC_1A-19A-21A-42A_n257D<br>DC_1A-19A-21A-42A_n257E<br>DC_1A-19A-21A-42A_n257F<br>DC_1A-19A-21A-42C_n257A<br>DC_1A-19A-21A-42C_n257D<br>DC_1A-19A-21A-42C_n257E<br>DC_1A-19A-21A-42C_n257F | DC_1A_n257A<br>DC_19A_n257A<br>DC_21A_n257A<br>DC_42A_n257A |
| DC_1A-19A-28A-42C_n257A  | DC_1A_n257A<br>DC_19A_n257A<br>DC_28A_n257A<br>DC_42A_n257A |
| DC_1A-21A-28A-42A_n257A  | DC_1A_n257A<br>DC_21A_n257A<br>DC_28A_n257A<br>DC_42A_n257A |
| NOTE 1: Uplink EN-DC configurations are the configurations supported by the present release of specifications. NOTE 2: Void  |   |

5.5B.5.5 Void

5.5B.6 Inter-band EN-DC including FR1 and FR2

5.5B.6.1 Void

5.5B.6.2 Inter-band EN-DC configurations including FR1 and FR2 (three bands)

Table 5.5B.6.2-1: Inter-band EN-DC configurations including FR1 and FR2 (three bands)

| EN-DC configuration  | Uplink EN-DC configuration (NOTE 1)           |
|--|---|
| DC_1A_n77A-n257A<br>DC_1A_n77A-n257D<br>DC_1A_n77A-n257E<br>DC_1A_n77A-n257F<br>DC_1A_n77C-n257A<br>DC_1A_n77C-n257D<br>DC_1A_n77C-n257E<br>DC_1A_n77C-n257F | DC_1A_n77A<br>DC_1A_n257A<br>DC_1A_n77A-n257A |
| DC_1A_n78A-n257A<br>DC_1A_n78A-n257D<br>DC_1A_n78A-n257E<br>DC_1A_n78A-n257F<br>DC_1A_n78C-n257A<br>DC_1A_n78C-n257D<br>DC_1A_n78C-n257E<br>DC_1A_n78C-n257F | DC_1A_n78A<br>DC_1A_n257A<br>DC_1A_n78A-n257A |
| DC_1A_n79A-n257A<br>DC_1A_n79A-n257D<br>DC_1A_n79A-n257E<br>DC_1A_n79A-n257F<br>DC_1A_n79C-n257A<br>DC_1A_n79C-n257D<br>DC_1A_n79C-n257E<br>DC_1A_n79C-n257F | DC_1A_n79A<br>DC_1A_n257A<br>DC_1A_n79A-n257A |
| DC_3A_n77A-n257A<br>DC_3A_n77A-n257D<br>DC_3A_n77A-n257E<br>DC_3A_n77A-n257F   | DC_3A_n77A<br>DC_3A_n257A<br>DC_3A_n77A-n257A |

| EN-DC configuration  | Uplink EN-DC configuration (NOTE 1)              |
|--|--|
| DC_3A_n77C-n257A<br>DC_3A_n77C-n257D<br>DC_3A_n77C-n257E<br>DC_3A_n77C-n257F   |  |
| DC_3A_n78A-n257A<br>DC_3A_n78A-n257D<br>DC_3A_n78A-n257E<br>DC_3A_n78A-n257F<br>DC_3A_n78C-n257A<br>DC_3A_n78C-n257D<br>DC_3A_n78C-n257E<br>DC_3A_n78C-n257F         | DC_3A_n78A<br>DC_3A_n257A<br>DC_3A_n78A-n257A    |
| DC_3A_n79A-n257A<br>DC_3A_n79A-n257D<br>DC_3A_n79A-n257E<br>DC_3A_n79A-n257F<br>DC_3A_n79C-n257A<br>DC_3A_n79C-n257D<br>DC_3A_n79C-n257E<br>DC_3A_n79C-n257F         | DC_3A_n79A<br>DC_3A_n257A<br>DC_3A_n79A-n257A    |
| DC_5A_n78A-n257A <sup>2</sup>  | DC_5A_n78A<br>DC_5A_n257A                        |
| DC_7A_n78A-n257A   | DC_7A_n78A<br>DC_7A_n257A                        |
| DC_7A-7A_n78A-n257A  | DC_7A_n78A<br>DC_7A_n257A<br>DC_7A_n78A-n257A    |
| DC_19A_n77A-n257A<br>DC_19A_n77A-n257D<br>DC_19A_n77A-n257E<br>DC_19A_n77A-n257F<br>DC_19A_n77C-n257A<br>DC_19A_n77C-n257D<br>DC_19A_n77C-n257E<br>DC_19A_n77C-n257F | DC_19A_n77A<br>DC_19A_n257A<br>DC_19A_n77A-n257A |
| DC_19A_n78A-n257A<br>DC_19A_n78A-n257D<br>DC_19A_n78A-n257E<br>DC_19A_n78A-n257F<br>DC_19A_n78C-n257A<br>DC_19A_n78C-n257D<br>DC_19A_n78C-n257E<br>DC_19A_n78C-n257F | DC_19A_n78A<br>DC_19A_n257A<br>DC_19A_n78A-n257A |
| DC_19A_n79A-n257A<br>DC_19A_n79A-n257D<br>DC_19A_n79A-n257E<br>DC_19A_n79A-n257F<br>DC_19A_n79C-n257A<br>DC_19A_n79C-n257D<br>DC_19A_n79C-n257E<br>DC_19A_n79C-n257F | DC_19A_n79A<br>DC_19A_n257A<br>DC_19A_n79A-n257A |
| DC_21A_n77A-n257A  | DC_21A_n77A<br>DC_21A_n257A                      |
| DC_21A_n78A-n257A  | DC_21A_n78A<br>DC_21A_n257A                      |
| DC_21A_n79A-n257A  | DC_21A_n79A<br>DC_21A_n257A                      |
| NOTE 1: Uplink EN-DC configurations are the configurations supported by the present release of specifications.   |  |
| NOTE 2: Applicable for UE supporting inter-band EN-DC with mandatory simultaneous Rx/Tx capability   |  |

## 5.5B.6.3 Inter-band EN-DC configurations including FR1 and FR2 (four bands)

Table 5.5B.6.3-1: Inter-band EN-DC configurations including FR1 and FR2 (four bands)

| EN-DC configuration  | Uplink EN-DC configuration (NOTE 1)                    |
|--|--|
| DC_1A-3A_n78A-n257A  | DC_1A_n78A<br>DC_1A_n257A<br>DC_3A_n78A<br>DC_3A_n257A |
| DC_1A-5A_n78A-n257A  | DC_1A_n78A<br>DC_1A_n257A<br>DC_5A_n78A<br>DC_5A_n257A |
| DC_1A-7A_n78A-n257A  | DC_1A_n78A<br>DC_1A_n257A<br>DC_7A_n78A<br>DC_7A_n257A |
| DC_1A-7A-7A_n78A-n257A   | DC_1A_n78A<br>DC_1A_n257A<br>DC_7A_n78A<br>DC_7A_n257A |
| DC_3A-5A_n78A-n257A  | DC_3A_n78A<br>DC_3A_n257A<br>DC_5A_n78A<br>DC_5A_n257A |
| DC_3A-7A_n78A-n257A  | DC_3A_n78A<br>DC_3A_n257A<br>DC_7A_n78A<br>DC_7A_n257A |
| DC_3A-7A-7A_n78A-n257A   | DC_3A_n78A<br>DC_3A_n257A<br>DC_7A_n78A<br>DC_7A_n257A |
| DC_5A-7A_n78A-n257A  | DC_5A_n78A<br>DC_5A_n257A<br>DC_7A_n78A<br>DC_7A_n257A |
| DC_5A-7A-7A_n78A-n257A   | DC_5A_n78A<br>DC_5A_n257A<br>DC_7A_n78A<br>DC_7A_n257A |
| NOTE 1: Uplink EN-DC configurations are the configurations supported by the present release of specifications. |  |

## 5.5B.6.4 Inter-band EN-DC configurations including FR1 and FR2 (five bands)

Table 5.5B.6.4-1: Inter-band EN-DC configurations including FR1 and FR2 (five bands)

| EN-DC configuration    | Uplink EN-DC configuration (NOTE 1)   |
|------------------------|---|
| DC_1A-3A-5A_n78A-n257A | DC_1A_n78A<br>DC_1A_n257A<br>DC_3A_n78A<br>DC_3A_n257A<br>DC_5A_n78A<br>DC_5A_n257A |
| DC_1A-3A-7A_n78A-n257A | DC_1A_n78A<br>DC_1A_n257A<br>DC_3A_n78A<br>DC_3A_n257A<br>DC_7A_n78A<br>DC_7A_n257A |

| EN-DC configuration  | Uplink EN-DC configuration (NOTE 1)   |
|--|---|
| DC_1A-3A-7A-7A_n78A-n257A  | DC_1A_n78A<br>DC_1A_n257A<br>DC_3A_n78A<br>DC_3A_n257A<br>DC_7A_n78A<br>DC_7A_n257A |
| DC_1A-5A-7A_n78A-n257A   | DC_1A_n78A<br>DC_1A_n257A<br>DC_5A_n78A<br>DC_5A_n257A<br>DC_7A_n78A<br>DC_7A_n257A |
| DC_1A-5A-7A-7A_n78A-n257A  | DC_1A_n78A<br>DC_1A_n257A<br>DC_5A_n78A<br>DC_5A_n257A<br>DC_7A_n78A<br>DC_7A_n257A |
| DC_3A-5A-7A_n78A-n257A   | DC_3A_n78A<br>DC_3A_n257A<br>DC_5A_n78A<br>DC_5A_n257A<br>DC_7A_n78A<br>DC_7A_n257A |
| DC_3A-5A-7A-7A_n78A-n257A  | DC_3A_n78A<br>DC_3A_n257A<br>DC_5A_n78A<br>DC_5A_n257A<br>DC_7A_n78A<br>DC_7A_n257A |
| NOTE 1: Uplink EN-DC configurations are the configurations supported by the present release of specifications. |   |

5.5B.6.5 Inter-band EN-DC configurations including FR1 and FR2 (six bands)

Table 5.5B.6.5-1: Inter-band EN-DC configurations including FR1 and FR2 (six bands)

| EN-DC configuration  | Uplink EN-DC configuration (NOTE 1)  |
|--|--|
| DC_1A-3A-5A-7A_n78A-n257A  | DC_1A_n78A<br>DC_1A_n257A<br>DC_3A_n78A<br>DC_3A_n257A<br>DC_5A_n78A<br>DC_5A_n257A<br>DC_7A_n78A<br>DC_7A_n257A |
| NOTE 1: Uplink EN-DC configurations are the configurations supported by the present release of specifications. |  |

5.5B.7 Inter-band NR-DC between FR1 and FR2

5.5B.7.0 General

The configurations and bandwidth combination sets for the FR1-FR2 NR-DC combinations in the following sub-section are defined in the tables for FR1-FR2 carrier aggregation in section 5.5A.1.

5.5B.7.1 Inter-band NR-DC configurations between FR1 and FR2 (two bands)

**Table 5.5B.7-1: Inter-band NR-DC configurations between FR1 and FR2 (two bands)**

| Downlink NR DC configuration  | Uplink NR DC configuration |
|---|----------------------------|
| DC_n77A-n257A<br>DC_n77A-n257D<br>DC_n77A-n257E<br>DC_n77A-n257F<br>DC_n77A-n257G<br>DC_n77A-n257H<br>DC_n77A-n257I<br>DC_n77A-n257J<br>DC_n77A-n257K<br>DC_n77A-n257L<br>DC_n77A-n257M<br>DC_n77C-n257A<br>DC_n77C-n257D<br>DC_n77C-n257E<br>DC_n77C-n257F | DC_n77A-n257A              |
| DC_n78A-n257A<br>DC_n78A-n257D<br>DC_n78A-n257E<br>DC_n78A-n257F<br>DC_n78A-n257G<br>DC_n78A-n257H<br>DC_n78A-n257I<br>DC_n78A-n257J<br>DC_n78A-n257K<br>DC_n78A-n257L<br>DC_n78A-n257M<br>DC_n78C-n257A<br>DC_n78C-n257D<br>DC_n78C-n257E<br>DC_n78C-n257F | DC_n78A-n257A              |
| DC_n79A-n257A<br>DC_n79A-n257D<br>DC_n79A-n257E<br>DC_n79A-n257F<br>DC_n79A-n257G<br>DC_n79A-n257H<br>DC_n79A-n257I<br>DC_n79A-n257J<br>DC_n79A-n257K<br>DC_n79A-n257L<br>DC_n79A-n257M<br>DC_n79C-n257A<br>DC_n79C-n257D<br>DC_n79C-n257E<br>DC_n79C-n257F | DC_n79A-n257A              |

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## 6 Transmitter characteristics

### 6.1 General

Unless otherwise stated the transmitter characteristics are specified at the antenna connector(s) of the UE for the bands operating on frequency range 1 and over the air of the UE for the bands operating on frequency range 2. The requirements for frequency range 1 and frequency range 2 can be verified separately. For the carrier in frequency range 1, requirements can be verified with NR FR2 link disabled. For the carrier in frequency range 2, requirements can be verified in OTA mode with E-UTRA connecting to the network by OTA without calibration.

Unless otherwise stated, requirements for NR transmitter written in TS 38.101-1 [2] and TS 38.101-2 [3] apply and are assumed anchor agnostic. Unless otherwise stated, if UE indicates IE maxNumberSRS-Ports-PerResource = n2 in NR standalone operation mode, the said UE shall meet the NR requirements for either power class 2 or power class 3 in EN-DC within FR1 if UE indicates IE maxNumberSRS-Ports-PerResource = n1 for EN-DC on this NR band. Requirements are verified under conditions where anchor resources do not interfere NR operation.

### 6.2 Void

#### 6.2A Transmitter power for CA

##### 6.2A.1 UE maximum output power for CA

###### 6.2A.1.1 Inter-band CA between FR1 and FR2

**Table 6.2A.1.1-1: Void**

For inter-band NR CA in FR1 and FR2 combined, the UE shall meet each transmitter power requirement specified in clause 6.2.1 of TS 38.101-1 [2] for NR single carrier and clause 6.2.1 and clause 6.2.1D of TS 38.101-2 [3] for NR single carrier and UL-MIMO independently.

##### 6.2A.2 UE maximum output power reduction for CA

###### 6.2A.2.1 Inter-band CA between FR1 and FR2

For inter-band NR CA between FR1 and FR2, UE maximum output power reduction specified in TS 38.101-1 [2] and TS 38.101-2 [3] apply for each frequency range respectively.

##### 6.2A.3 UE additional maximum output power reduction for CA

For inter-band NR CA between FR1 and FR2, UE additional maximum output power reduction specified in TS 38.101-1 [2] and TS 38.101-2 [3] apply for each frequency range respectively.

##### 6.2A.4 Configured output power for CA

###### 6.2A.4.1 Configured output power level

For inter-band NR CA between FR1 and FR2, UE configured output power specified in TS 38.101-1 [2] and TS 38.101-2 [3] apply for each frequency range respectively.

## 6.2A.4.2 $\Delta T_{IB,c}$ for CA

### 6.2A.4.2.1 $\Delta T_{IB,c}$ for Inter-band CA between FR1 and FR2

Unless otherwise stated,  $\Delta T_{IB,c}$  for NR FR1 band and FR2 band of inter-band CA defined in table 5.5A.1-1 is set to zero.

**Table 6.2A.4.2.1-1: Void**

## 6.2B Transmitter power for DC

### 6.2B.1 UE maximum output power for DC

#### 6.2B.1.1 Intra-band contiguous EN-DC

The following UE Power Classes define the total maximum output power for any transmission bandwidth(s) of the CG(s) configured.

The maximum output power is measured as the total maximum output power across the UE antenna connector(s). The period of measurement shall be at least one sub frame.

**Table 6.2B.1.1-1: Maximum output power for EN-DC (continuous sub-blocks)**

| EN-DC configuration   | Power class 2 (dBm) | Tolerance (dB)     | Power class 3 (dBm) | Tolerance (dB)     |
|---|---------------------|--------------------|---------------------|--------------------|
| DC_(n)71AA  |                     |                    | 23                  | +2/-3              |
| DC_(n)41AA  | 26                  | +2/-3 <sup>1</sup> | 23                  | +2/-3 <sup>1</sup> |
| NOTE 1: If all transmitted resource blocks over all component carriers are confined within $F_{UL\_low}$ and $F_{UL\_low} + 4$ MHz or/and $F_{UL\_high} - 4$ 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.   |                     |                    |                     |                    |

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

- if the E-UTRA UL/DL configuration is 0 or 6; or
- if the E-UTRA UL/DL configuration is 1 and special subframe configuration is 0 or 5; or
- if the IE *p-maxUE-FR1-r15* as defined in TS 36.331 [8] is provided and set to the maximum output power of the default power class or lower;
  - apply all requirements for the default power class, and set the configured transmitted power as specified in clause 6.2B.4;
- else
  - apply all requirements for the supported power class, and set the configured transmitted power class as specified in clause 6.2B.4;

#### 6.2B.1.2 Intra-band non-contiguous EN-DC

**Table 6.2B.1.2-1: Maximum output power for EN-DC (non-continuous sub-blocks)**

| EN-DC configuration    | Power class 2 (dBm) | Tolerance (dB)     | Power class 3 (dBm) | Tolerance (dB)     |
|------------------------|---------------------|--------------------|---------------------|--------------------|
| DC_3A_n3A <sup>2</sup> |                     |                    | 23                  | +2/-3              |
| DC_41A_n41A            | 26                  | +2/-3 <sup>1</sup> | 23                  | +2/-3 <sup>1</sup> |



NOTE 1: If all transmitted resource blocks over all component carriers are confined within  $F_{UL\_low}$  and  $F_{UL\_low} + 4$  MHz or/and  $F_{UL\_high} - 4$  MHz and  $F_{UL\_high}$ , the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB

NOTE 2: Only single switched UL is supported in Rel.15

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

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

- if the E-UTRA UL/DL configuration is 0 or 6; or
- if the E-UTRA UL/DL configuration is 1 and special subframe configuration is 0 or 5; or
- if the IE *p-maxUE-FR1-r15* as defined in TS 36.331 [8] is provided and set to the maximum output power of the default power class or lower;
  - apply all requirements for the default power class, and set the configured transmitted power as specified in clause 6.2B.4;
- else
- apply all requirements for the supported power class, and set the configured transmitted power class as specified in clause 6.2B.4;

### 6.2B.1.3 Inter-band EN-DC within FR1

For inter-band EN-DC of E-UTRA and NR in FR1, the following UE Power Classes define the maximum output power for any transmission bandwidth within the aggregated channel bandwidth. The maximum output power is measured as the sum of the maximum output power at each UE antenna connector. The period of measurement shall be at least one sub frame (1ms). 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 measured as the sum of maximum output power at each UE antenna connector.

**Table 6.2B.1.3-1: Maximum output power for inter-band EN-DC (two bands)**

| EN-DC configuration                      | Power class 3 (dBm) | Tolerance (dB)     |
|--|---------------------|--------------------|
| DC_1A_n28A                               | 23                  | +2/-3              |
| DC_1A_n40A                               | 23                  | +2/-3              |
| DC_1A_n51A                               | 23                  | +2/-3              |
| DC_1A_n77A                               | 23                  | +2/-3              |
| DC_1A_n78A<br>DC_1A_n84A_ULSUP-TDM_n78A  | 23                  | +2/-3              |
| DC_1A_n79A                               | 23                  | +2/-3              |
| DC_2A_n5A                                | 23                  | +2/-3 <sup>1</sup> |
| DC_2A_n66A                               | 23                  | +2/-3 <sup>1</sup> |
| DC_2A_n71A                               | 23                  | +2/-3              |
| DC_2A_n78A                               | 23                  | +2/-3              |
| DC_3A_n7A                                | 23                  | +2/-3 <sup>1</sup> |
| DC_3A_n28A                               | 23                  | +2/-3 <sup>1</sup> |
| DC_3A_n40A                               | 23                  | +2/-3 <sup>1</sup> |
| DC_3A_n51A                               | 23                  | +2/-3 <sup>1</sup> |
| DC_3A_n77A                               | 23                  | +2/-3 <sup>1</sup> |
| DC_3A_n78A<br>DC_3A_n80A_ULSUP-TDM_n78A, | 23                  | +2/-3 <sup>1</sup> |
| DC_3A_n79A<br>DC_3A_n80A_ULSUP-TDM_n79A, | 23                  | +2/-3 <sup>1</sup> |

| EN-DC configuration                        | Power class 3 (dBm) | Tolerance (dB)     |
|--|---------------------|--------------------|
| DC_3A_n82A                                 | 23                  | +2/-3 <sup>1</sup> |
| DC_5A_n40A                                 | 23                  | +2/-3 <sup>1</sup> |
| DC_5A_n66A                                 | 23                  | +2/-3 <sup>1</sup> |
| DC_5A_n78A                                 | 23                  | +2/-3              |
| DC_7A_n28A                                 | 23                  | +2/-3 <sup>1</sup> |
| DC_7A_n51A                                 | 23                  | +2/-3 <sup>1</sup> |
| DC_7A_n78A<br>DC_7C_n78A                   | 23                  | +2/-3              |
| DC_8A_n40A                                 | 23                  | +2/-3 <sup>1</sup> |
| DC_8A_n77A                                 | 23                  | +2/-3              |
| DC_8A_n78A<br>DC_8A_n81A_ULSUP-TDM_n78A,   | 23                  | +2/-3              |
| DC_8A_n79A<br>DC_8A_n81A_ULSUP-TDM_n79A,   | 23                  | +2/-3              |
| DC_11A_n77A                                | 23                  | +2/-3              |
| DC_11A_n78A                                | 23                  | +2/-3              |
| DC_11A_n79A                                | 23                  | +2/-3              |
| DC_12A_n5A                                 | 23                  | +2/-3              |
| DC_12A_n66A                                | 23                  | +2/-3              |
| DC_18A_n77A                                | 23                  | +2/-3              |
| DC_18A_n78A                                | 23                  | +2/-3              |
| DC_18A_n79A                                | 23                  | +2/-3              |
| DC_19A_n77A                                | 23                  | +2/-3              |
| DC_19A_n78A                                | 23                  | +2/-3              |
| DC_19A_n79A                                | 23                  | +2/-3              |
| DC_20A_n8A                                 | 23                  | +2/-3              |
| DC_20A_n28A<br>DC_20A_n83A                 | 23                  | +2/-3              |
| DC_20A_n51A                                | 23                  | +2/-3              |
| DC_20A_n77A                                | 23                  | +2/-3              |
| DC_20A_n78A<br>DC_20A_n82A_ULSUP-TDM_n78A, | 23                  | +2/-3              |
| DC_21A_n77A                                | 23                  | +2/-3              |
| DC_21A_n78A                                | 23                  | +2/-3              |
| DC_21A_n79A                                | 23                  | +2/-3              |
| DC_25A_n41A                                | 23                  | +2/-3              |
| DC_26A_n41A                                | 23                  | +2/-3              |
| DC_26A_n77A                                | 23                  | +2/-3              |
| DC_26A_n78A                                | 23                  | +2/-3              |
| DC_26A_n79A                                | 23                  | +2/-3              |
| DC_28A_n51A                                | 23                  | +2/-3              |
| DC_28A_n77A                                | 23                  | +2/-3              |
| DC_28A_n78A<br>DC_28A_n83A_ULSUP-TDM_n78A, | 23                  | +2/-3              |
| DC_28A_n79A                                | 23                  | +2/-3              |
| DC_30A_n5A                                 | 23                  | +2/-3              |

| EN-DC configuration  | Power class 3 (dBm) | Tolerance (dB)     |
|--|---------------------|--------------------|
| DC_30A_n66A  | 23                  | +2/-3              |
| DC_38A_n78A  | N/A                 | N/A                |
| DC_39A_n78A  | 23                  | +2/-3 <sup>1</sup> |
| DC_39A_n79A  | 23                  | +2/-3 <sup>1</sup> |
| DC_40A_n77A  | N/A                 | N/A                |
| DC_41A_n77A<br>DC_41C_n77A   | 23                  | +2/-3 <sup>1</sup> |
| DC_41A_n78A<br>DC_41C_n78A   | 23                  | +2/-3 <sup>1</sup> |
| DC_41A_n79A<br>DC_41C_n79A   | 23                  | +2/-3 <sup>1</sup> |
| DC_42A_n51A  | 23                  | +2/-3              |
| DC_42A_n77A  | N/A                 | N/A                |
| DC_42A_n78A  | N/A                 | N/A                |
| DC_42A_n79A  | N/A                 | N/A                |
| DC_66A_n5A   | 23                  | +2/-3 <sup>1</sup> |
| DC_66A_n71A  | 23                  | +2/-3              |
| DC_66A_n78A, DC_66A_n86A_ULSUP-TDM_n78A,   | 23                  | +2/-3              |
| NOTE 1: For 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: $P_{PowerClass, EN-DC}$ is the maximum UE power specified without taking into account the tolerance  |                     |                    |
| NOTE 3: For inter-band EN-DC the maximum power requirement should 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.  |                     |                    |

### 6.2B.1.3a Inter-band NE-DC within FR1

For inter-band NE-DC of E-UTRA and NR in FR1, the following UE power classes define the maximum output power for any transmission bandwidth within the aggregated channel bandwidth. The maximum output power is measured as the sum of the maximum output power at each UE antenna connector. The period of measurement shall be at least one sub frame (1 ms). 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 measured as the sum of maximum output power at each UE antenna connector.

**Table 6.2B.1.3a-1: Maximum output power for inter-band NE-DC (two bands)**

| NE-DC configuration | Power class 3 (dBm) | Tolerance (dB) |
|---------------------|---------------------|----------------|
| DC_n1A_28A          | 23                  | +2/-3          |

### 6.2B.1.4 Inter-band EN-DC including FR2

UE maximum output power requirement for E-UTRA single carrier and CA operation specified in clauses 6.2.2 and 6.2.2A of TS 36.101 [4] and for NR single carrier, CA operation and UL-MIMO specified in clause 6.2.1, 6.2A.1, and 6.2D.1 of TS 38.101-2 [3] apply.

### 6.2B.1.5 Inter-band EN-DC including both FR1 and FR2

UE maximum output power requirement for E-UTRA single carrier and CA operation specified in clauses 6.2.2 and 6.2.2A of TS 36.101 [4] and for NR single carrier specified in clause 6.2.1 of TS 38.101-1 [2] and for NR single carrier, CA operation and UL-MIMO specified in clause 6.2.1, 6.2A.1, and 6.2D.1 of TS 38.101-2 [3] apply. When uplink is

EN-DC mode within FR1 only then UE maximum output power requirement is specified in clause 6.2B.1.3 of this specification.

## 6.2B.2 UE maximum output power reduction for DC

### 6.2B.2.0 General

The UE maximum output power reduction (MPR) specified in this clause is applicable for UEs configured with EN-DC when NS\_01 is indicated in the MCG and the SCG. The MPR applies subject to indication in the field *modifiedMPRbehavior* for the SCG [2].

### 6.2B.2.1 Intra-band contiguous EN-DC

#### 6.2B.2.1.1 General

When the UE is configured for intra-band contiguous EN-DC, the UE determines the total allowed maximum output power reduction as specified in this clause.

For UE supporting dynamic power sharing the following:

- for the MCG,  $MPR_c$  in accordance with TS 36.101 [4]
- for the SCG,

$$MPR'_c = MPR_{NR} = \text{MAX}(MPR_{\text{single,NR}}, MPR_{\text{ENDC}})$$

- for the total configured transmission power,

$$MPR_{\text{tot}} = P_{\text{PowerClass,EN-DC}} - \min(P_{\text{PowerClass,EN-DC}}, 10 \cdot \log_{10}(10^{(P_{\text{PowerClass,E-UTRA}} - MPR_{\text{E-UTRA}})/10}) + 10^{(P_{\text{PowerClass,NR}} - MPR_{\text{NR}})/10}))$$

where

$$MPR_{\text{E-UTRA}} = \text{MAX}(MPR_{\text{single,E-UTRA}}, MPR_{\text{ENDC}})$$

with

- $MPR_{\text{single,E-UTRA}}$  is the MPR defined for the E-UTRA transmission in TS 36.101 [4]
- $MPR_{\text{single,NR}}$  is the MPR defined for the NR transmission in TS 38.101-1 [2]

For UEs not supporting dynamic power sharing the following

- for the MCG,

$$MPR_c = \text{MAX}(MPR_{\text{single,E-UTRA}}, MPR_{\text{ENDC}})$$

- for the SCG,

$$MPR'_c = \text{MAX}(MPR_{\text{single,NR}}, MPR_{\text{ENDC}})$$

where

- $MPR_{\text{single,NR}}$  is the MPR defined for the NR transmission in TS 38.101-1 [2]
- $MPR_{\text{single,E-UTRA}}$  is the MPR defined for the E-UTRA transmission in TS 36.101 [4]

$MPR_{\text{ENDC}}$  is defined in Clause 6.2B.2.1.2

#### 6.2B.2.1.2 MPR for power class 3 and power class 2

MPR in this clause is applicable for power class 3 and power class 2 UEs indicating IE *dualPA-Architecture* supported with ENDC power class being the same as the E-UTRA and NR power class, otherwise the UE can use as much MPR as needed to fulfil emissions requirements when scheduled with dual uplink transmission. For UEs scheduled with

single uplink transmission, MPR in clause 6.2.4 of TS 36.101 [4] and 6.2.2 of TS 38.101-1 [2] apply. For a UE supporting dynamic power sharing for DC\_(n)71AA for which dual simultaneous uplink transmissions are mandatory and A-MPR defined in clause 6.2B.3.1.1 is applied as MPR. The allowed maximum output power reduction applied to transmission on the MCG and the SCG is defined as follows:

$$\text{MPR}_{\text{ENDC}} = M_A$$

Where  $M_A$  is defined as follows

$$M_A = \begin{cases} 15 & ; \quad 0 \leq B < 0.5 \\ 10 & ; \quad 0.5 \leq B < 1.0 \\ 8 & ; \quad 1.0 \leq B < 2.0 \\ 6 & ; \quad 2.0 \leq B \end{cases}$$

Where:

For UEs supporting dynamic power sharing,

$$B = (\text{LCRB}_{\text{alloc, E-UTRA}} * 12 * \text{SCS}_{\text{E-UTRA}} + \text{LCRB}_{\text{alloc, NR}} * 12 * \text{SCS}_{\text{NR}}) / 1,000,000$$

For UEs not supporting dynamic power sharing,

For E-UTRA

$$B = (\text{LCRB}_{\text{alloc, E-UTRA}} * 12 * \text{SCS}_{\text{E-UTRA}} + 12 * \text{SCS}_{\text{NR}}) / 1,000,000$$

Where  $\text{SCS}_{\text{NR}} = 15,000$  Hz is assumed in calculation of B.

For NR

$$B = (12 * \text{SCS}_{\text{E-UTRA}} + \text{LCRB}_{\text{alloc, NR}} * 12 * \text{SCS}_{\text{NR}}) / 1,000,000$$

Where  $\text{SCS}_{\text{E-UTRA}} = 15,000$  Hz is assumed in calculation of B.

and  $M_A$  is reduced by 1 dB for  $B < 2$ .

## 6.2B.2.2 Intra-band non-contiguous EN-DC

### 6.2B.2.2.1 General

When the UE is configured for intra-band non-contiguous EN-DC, the UE determines the total allowed maximum output power reduction as specified in this clause.

For UE supporting dynamic power sharing the following:

- for the MCG,  $\text{MPR}'_c$  in accordance with TS 36.101 [4]
- for the SCG,

$$\text{MPR}'_c = \text{MPR}_{\text{NR}} = \text{MAX}(\text{MPR}_{\text{single, NR}}, \text{MPR}_{\text{ENDC}})$$

- for the total configured transmission power,

$$\text{MPR}_{\text{tot}} = P_{\text{PowerClass, EN-DC}} - \min(P_{\text{PowerClass, EN-DC}}, 10 * \log_{10}(10^{((P_{\text{PowerClass, E-UTRA}} - \text{MPR}_{\text{E-UTRA}}) / 10)} + 10^{((P_{\text{PowerClass, NR}} - \text{MPR}_{\text{NR}}) / 10)}))$$

where

$$\text{MPR}_{\text{E-UTRA}} = \text{MAX}(\text{MPR}_{\text{single, E-UTRA}}, \text{MPR}_{\text{ENDC}})$$

with

- $\text{MPR}_{\text{single, E-UTRA}}$  is the MPR defined for the E-UTRA transmission in TS 36.101 [4]

- $MPR_{single,NR}$  is the MPR defined for the NR transmission in TS 38.101-1 [2]

For UEs not supporting dynamic power sharing the following

- for the MCG,

$$MPR_c = \text{MAX}(MPR_{single,E-UTRA}, MPR_{ENDC})$$

- for the SCG,

$$MPR'_c = \text{MAX}(MPR_{single,NR}, MPR_{ENDC})$$

where

- $MPR_{single,NR}$  is the MPR defined for the NR transmission in TS 38.101-1 [2]
- $MPR_{single,E-UTRA}$  is the MPR defined for the E-UTRA transmission in TS 36.101 [4]

$MPR_{ENDC}$  is defined in Clause 6.2B.2.2.2

### 6.2B.2.2.2 MPR for power class 3 and power class 2

MPR in this clause is applicable for power class 3 and power class 2 UEs indicating IE *dualPA-Architecture* supported with ENDC power class being the same as the E-UTRA and NR power class, otherwise the UE can use as much MPR as needed to fulfil emissions requirements when scheduled with dual uplink transmission. For UEs scheduled with single uplink transmission, MPR in clause 6.2.4 of TS 36.101 [4] and 6.2.2 of TS 38.101-1 [2] apply. The allowed maximum output power reduction for IM3 related emissions applied to transmission on the MCG and the SCG is defined as follows:

$$MPR_{ENDC} = M_A$$

Where  $M_A$  is defined as follows

$$\begin{aligned} M_A = & 18 ; & 0 \leq B < 1.0 \\ & 17 ; & 1.0 \leq B < 2.0 \\ & 16 ; & 2.0 \leq B < 5.0 \\ & 15 ; & 5.0 \leq B \end{aligned}$$

Where:

For UEs supporting dynamic power sharing,

$$B = (L_{CRB\_alloc, E-UTRA} * 12 * SCS_{E-UTRA} + L_{CRB\_alloc, NR} * 12 * SCS_{NR}) / 1,000,000$$

For UEs not supporting dynamic power sharing,

For E-UTRA

$$B = (L_{CRB\_alloc, E-UTRA} * 12 * SCS_{E-UTRA} + 12 * SCS_{NR}) / 1,000,000$$

Where  $SCS_{NR} = 15,000$  Hz is assumed in calculation of B.

For NR

$$B = (12 * SCS_{E-UTRA} + L_{CRB\_alloc, NR} * 12 * SCS_{NR}) / 1,000,000$$

Where  $SCS_{E-UTRA} = 15,000$  Hz is assumed in calculation of B.

and  $M_A$  is reduced by 1 dB for  $B < 2$ .

### 6.2B.2.3 Inter-band EN-DC within FR1

For inter-band EN-DC between E-UTRA and FR1 NR, UE maximum output power reduction specified in TS 36.101 [4] and TS 38.101-1 [2] apply for E-UTRA and NR respectively.

### 6.2B.2.3a Inter-band NE-DC within FR1

For inter-band NE-DC between E-UTRA and FR1 NR, UE maximum output power reduction specified in TS 36.101 [4] and TS 38.101-1 [2] apply for E-UTRA and NR respectively.

### 6.2B.2.4 Inter-band EN-DC including FR2

UE maximum output power reduction requirement for E-UTRA single carrier and CA operation specified in clauses 6.2.3 and 6.2.3A of TS 36.101 [4] and for NR single carrier, CA operation and UL-MIMO specified in clause 6.2.2, 6.2A.2, and 6.2D.2 of TS 38.101-2 [3] apply.

### 6.2B.2.5 Inter-band EN-DC including both FR1 and FR2

UE maximum output power reduction requirement for E-UTRA single carrier and CA operation specified in clauses 6.2.3 and 6.2.3A of TS 36.101 [4] and for NR single carrier specified in clause 6.2.2 of TS 38.101-1 [2] and for NR single carrier, CA operation and UL-MIMO specified in clause 6.2.2, 6.2A.2, and 6.2D.2 of TS 38.101-2 [3] apply.

## 6.2B.3 UE additional maximum output power reduction for EN-DC

### 6.2B.3.1 Intra-band contiguous EN-DC

#### 6.2B.3.1.0 General

For intra-band contiguous EN-DC band combinations with additional requirements the allowed A-MPR is specified in Table 6.2B.3.1.0-1 for UEs configured with EN-DC and combinations of network signalling values indicated in the E-UTRA and NR cell groups.

Unless otherwise stated the A-MPR specified in clause 6.2B.3.1 for intra-band contiguous EN-DC configurations is the total power reduction allowed including MPR.

**Table 6.2B.3.1.0-1: Additional maximum power reduction for Intra-band contiguous EN-DC**

| DC configuration   | Requirement (clause) | E-UTRA network signalling value | NR network signalling value | A-MPR (clause)          |
|--|----------------------|---------------------------------|-----------------------------|-------------------------|
| DC_(n)71AA   | 6.5B.2.1.2.1         | NS_35                           | NS_35                       | 6.2B.3.1.1 <sup>3</sup> |
| DC_(n)41AA <sup>1</sup>  | 6.5B.2.1.2.2         | NS_01 or NS_04                  | NS_04                       | 6.2B.3.1.2 <sup>4</sup> |
| NOTE 1: Only applies to UEs that support dual UL transmission for this EN-DC combination.  |                      |                                 |                             |                         |
| NOTE 2: The additional emission requirement is indicated when the combination of network signalling values in the two CGs is set (only for UEs configured with EN-DC). |                      |                                 |                             |                         |
| NOTE 3: The A-MPR is applied as MPR if NS_35 is not signalled.   |                      |                                 |                             |                         |
| NOTE 4: Void   |                      |                                 |                             |                         |

#### 6.2B.3.1.1 A-MPR for DC\_(n)71AA

For UE supporting dynamic power sharing the following:

- for the MCG,  $A-MPR_c$  in accordance with TS 36.101 [4]
- for the SCG,  $A-MPR'_c = A-MPR_{DC}$
- for the total configured transmission power,  $A-MPR_{tot} = A-MPR_{DC}$

with  $A-MPR_{DC}$  as defined in this clause.

For UEs not supporting dynamic power sharing the following

- for the MCG,

$$A-MPR_c = A-MPR_{E-UTRA}$$

- for the SCG,

$$A\text{-MPR}'_c = A\text{-MPR}_{\text{NR}}$$

with  $A\text{-MPR}_{\text{E-UTRA}}$  and  $A\text{-MPR}_{\text{NR}}$  as defined in this clause.

For DC\_(n)71AA with configured with network signaling values as per Table 6.2B.3.1.0-1 the allowed A-MPR is defined by

- for UE indicating support of dynamicPowerSharing in the *UE-MRDC-Capability* IE

$$A\text{-MPR}_{\text{DC}} = \text{CEIL}\{ M_{\text{A,DC}}(A), 0.5\}$$

where  $A\text{-MPR}_{\text{DC}}$  is the total power reduction allowed (dB),

- for OFDM:

$$M_{\text{A,DC}} = 11.00 - 11.67 * A; \quad 0.00 < A \leq 0.30$$

$$8.10 - 2.00 * A; \quad 0.30 < A \leq 0.80$$

$$6.50; \quad 0.80 < A \leq 1.00$$

- for DFT-S-OFDM:

$$M_{\text{A,DC}} = 11.00 - 13.33 * A; \quad 0.00 < A \leq 0.30$$

$$8.00 - 3.33 * A; \quad 0.30 < A \leq 0.60$$

$$6.00; \quad 0.60 < A \leq 1.00$$

where

$$A = \frac{L_{\text{CRB,E-UTRA}} + L_{\text{CRB,NR}}}{N_{\text{RB,E-UTRA}} + N_{\text{RB,NR}}}$$

with  $L_{\text{CRB,E-UTRA}}$  and  $N_{\text{RB,E-UTRA}}$  the number of allocated PRB and transmission bandwidth for MCG,  $L_{\text{CRB,NR}}$  and  $N_{\text{RB,NR}}$  the number of allocated PRB and transmission bandwidth for SCG with SCS = 15 kHz.

- for UE not indicating support of dynamicPowerSharing

$$A\text{-MPR}_{\text{E-UTRA}} = \text{CEIL}\{ M_{\text{A,E-UTRA}}, 0.5\}$$

$$A\text{-MPR}_{\text{NR}} = \text{CEIL}\{ M_{\text{A,NR}}, 0.5\}$$

where A-MPR is the total power reduction allowed per CG with

$$M_{\text{A,E-UTRA}} = M_{\text{A,DC}}(A_{\text{E-UTRA,wc}}) - 1 - \Delta_{\text{E-UTRA}}$$

$$M_{\text{A,NR}} = M_{\text{A,DC}}(A_{\text{NR,wc}}) - 1 - \Delta_{\text{NR}}$$

$$A_{\text{E-UTRA,wc}} = \frac{L_{\text{CRB,E-UTRA}} + 1}{N_{\text{RB,E-UTRA}} + N_{\text{RB,NR}}}$$

$$A_{\text{NR,wc}} = \frac{1 + L_{\text{CRB,NR}}}{N_{\text{RB,E-UTRA}} + N_{\text{RB,NR}}}$$

$$\Delta_{\text{E-UTRA}} = 10 \log_{10} \frac{N_{\text{RB,E-UTRA}}}{N_{\text{RB,E-UTRA}} + N_{\text{RB,NR}}}$$

$$\Delta_{\text{NR}} = 10 \log_{10} \frac{N_{\text{RB,NR}}}{N_{\text{RB,E-UTRA}} + N_{\text{RB,NR}}}$$

Where  $L_{\text{CRB,NR}}$  and  $N_{\text{RB,NR}}$  the number of allocated PRB and transmission bandwidth for SCG with SCS = 15 kHz.



## 6.2B.3.1.2 A-MPR for NS\_04

## 6.2B.3.1.2.0 General

When the UE is configured for B41/n41 intra-band contiguous EN-DC and it receives IE NS\_04, the UE determines the total allowed maximum output power reduction as specified in this clause. The A-MPR for EN-DC defined in this clause is used instead of MPR defined in 6.2B.2.1, not additively, so EN-DC MPR = 0 when NS\_04 is signaled. For UEs scheduled with single uplink transmission, AMPR in clause 6.2.4 of [4] and 6.2.3 of [2] apply.

For UE supporting dynamic power sharing the following:

- for the MCG, A-MPR<sub>c</sub> in accordance with TS 36.101 [4]
- for the SCG,

$$A-MPR'_c = A-MPR_{NR} = \text{MAX}(A-MPR_{\text{single,NR}}, A-MPR_{IM3})$$

- for the total configured transmission power,

$$A-MPR_{\text{tot}} = P_{\text{PowerClass,EN-DC}} - \min(P_{\text{PowerClass,EN-DC}}, 10 * \log_{10}(10^{(P_{\text{PowerClass,E-UTRA}} - A-MPR_{E-UTRA})/10}) + 10^{(P_{\text{PowerClass,NR}} - A-MPR_{NR})/10}))$$

where

$$A-MPR_{E-UTRA} = \text{MAX}(A-MPR_{\text{single,E-UTRA}} + MPR_{\text{single,E-UTRA}}, A-MPR_{IM3})$$

with

- A-MPR<sub>single, E-UTRA</sub> is the A-MPR defined for the E-UTRA transmission in TS 36.101 [4]
- A-MPR<sub>single,NR</sub> is the A-MPR defined for the NR transmission in TS 38.101-1 [2]
- MPR<sub>single,E-UTRA</sub> is the MPR defined for the E-UTRA transmission in TS 36.101 [4]

For UEs not supporting dynamic power sharing the following

- for the MCG,

$$A-MPR_c = \text{MAX}(A-MPR_{\text{single, E-UTRA}} + MPR_{\text{single,E-UTRA}}, A-MPR_{IM3})$$

- for the SCG,

$$A-MPR'_c = \text{MAX}(A-MPR_{\text{single,NR}}, A-MPR_{IM3})$$

where

- A-MPR<sub>single, E-UTRA</sub> is the A-MPR defined for the E-UTRA transmission in TS 36.101 [4]
- A-MPR<sub>single,NR</sub> is the A-MPR defined for the NR transmission in TS 38.101-1 [2]
- MPR<sub>single,E-UTRA</sub> is the MPR defined for the E-UTRA transmission in TS 36.101 [4]

The UE determines the Channel Configuration Case and the value of A-MPR<sub>IM3</sub> as follows:

If  $F_{IM3,low\_block,low} < 2490.5$  MHz

Channel Configuration Case B. A-MPR<sub>IM3</sub> defined in Clause 6.2B.3.1.2.2

Else

Channel Configuration Case A. A-MPR<sub>IM3</sub> defined in Clause 6.2B.3.1.2.1

where

- $F_{IM3,low\_block,low} = (2 * F_{low\_channel,low\_edge}) - F_{high\_channel,high\_edge}$
- $F_{low\_channel,low\_edge}$  is the lowermost frequency of lower transmission bandwidth configuration.

- $F_{\text{high\_channel,high\_edge}}$  is the uppermost frequency of upper transmission bandwidth configuration.

Where the transmission bandwidth configuration for NR is the maximum frequency span covering all the configured  $\text{SCSSpecificCarrier}$  for scenarios that carrier bandwidths with different SCS can be fully overlapped.

#### 6.2B.3.1.2.1 A-MPR<sub>IM3</sub> for NS\_04 to meet -13 dBm / 1MHz for 26dBm UE power

A-MPR in this clause is relative to 26 dBm for a power class 2 Cell Group. The same A-MPR is used relative to 23 dBm for a power class 3 Cell Group. For the UE is configured with channel configurations Case A or Case C (defined in Clause 6.2B.3.2.1), the allowed maximum output power reduction for IM3s applied to transmission on the MCG and the SCG with non-contiguous resource allocation is defined as follows:

$$\text{A-MPR}_{\text{IM3}} = M_A$$

Where  $M_A$  is defined as follows

$$M_A = \begin{array}{ll} 15 & ; \quad 0 \leq B < 0.5 \\ 10 & ; \quad 0.5 \leq B < 1.0 \\ 8 & ; \quad 1.0 \leq B < 2.0 \\ 6 & ; \quad 2.0 \leq B \end{array}$$

Where:

For UEs supporting dynamic power sharing,

$$B = (\text{L}_{\text{CRB\_alloc, E-UTRA}} * 12 * \text{SCS}_{\text{E-UTRA}} + \text{L}_{\text{CRB\_alloc, NR}} * 12 * \text{SCS}_{\text{NR}}) / 1,000,000$$

For UEs not supporting dynamic power sharing,

For E-UTRA

$$B = (\text{L}_{\text{CRB\_alloc, E-UTRA}} * 12 * \text{SCS}_{\text{E-UTRA}} + 12 * \text{SCS}_{\text{NR}}) / 1,000,000$$

Where  $\text{SCS}_{\text{NR}} = 15,000$  Hz is assumed in calculation of B.

For NR

$$B = (12 * \text{SCS}_{\text{E-UTRA}} + \text{L}_{\text{CRB\_alloc, NR}} * 12 * \text{SCS}_{\text{NR}}) / 1,000,000$$

Where  $\text{SCS}_{\text{E-UTRA}} = 15,000$  Hz is assumed in calculation of B.

and  $M_A$  is reduced by 1 dB for  $B < 2.0$ .

#### 6.2B.3.1.2.2 A-MPR for NS\_04 to meet -25 dBm / 1MHz for 26 dBm UE power

A-MPR in this clause is relative to 26 dBm for a power class 2 Cell Group. The same A-MPR is used relative to 23 dBm for a power class 3 Cell Group. For the UE is configured with channel configurations Case B or Case D (defined in Clause 6.2B.3.2.1), the allowed maximum output power reduction for IM3s applied to transmission on the MCG and the SCG with non-contiguous resource allocation is defined as follows:

$$\text{A-MPR}_{\text{IM3}} = M_A$$

Where  $M_A$  is defined as follows

$$M_A = \begin{array}{ll} 15 & ; \quad 0 \leq B < 1.0 \\ 14 & ; \quad 1.0 \leq B < 2.0 \\ 13 & ; \quad 2.0 \leq B < 5.0 \\ 12 & ; \quad 5.0 \leq B \end{array}$$

Where:

For UEs supporting dynamic power sharing,

$$B = (L_{\text{CRB\_alloc, E-UTRA}} * 12 * \text{SCS}_{\text{E-UTRA}} + L_{\text{CRB\_alloc, NR}} * 12 * \text{SCS}_{\text{NR}}) / 1,000,000$$

For UEs not supporting dynamic power sharing,

For E-UTRA

$$B = (L_{\text{CRB\_alloc, E-UTRA}} * 12 * \text{SCS}_{\text{E-UTRA}} + 12 * \text{SCS}_{\text{NR}}) / 1,000,000$$

Where  $\text{SCS}_{\text{NR}} = 15,000$  Hz is assumed in calculation of B.

For NR

$$B = (12 * \text{SCS}_{\text{E-UTRA}} + L_{\text{CRB\_alloc, NR}} * 12 * \text{SCS}_{\text{NR}}) / 1,000,000$$

Where  $\text{SCS}_{\text{E-UTRA}} = 15,000$  Hz is assumed in calculation of B.

and  $M_A$  is reduced by 1 dB.

## 6.2B.3.2 Intra-band non-contiguous EN-DC

### 6.2B.3.2.0 General

For intra-band non-contiguous EN-DC band combinations with additional requirements the A-MPR allowed are specified in Table 6.2B.3.2.0-1 for UEs configured with EN-DC and combinations of network signalling values indicated in the E-UTRA and NR cell group(s). Unless otherwise stated the A-MPR specified in clause 6.2B.3.2 for intra-band non-contiguous EN-DC configurations is the total power reduction allowed including MPR. For UEs scheduled with single uplink transmission, AMPR in clause 6.2.4 of [4] and 6.2.3 of [2] apply.

**Table 6.2B.3.2.0-1: Allowed power reduction for intra-band non-contiguous EN-DC**

| DC configuration  | Requirement (clause)   | E-UTRA network signalling value | NR network signalling value | A-MPR (clause) |
|---|--|---------------------------------|-----------------------------|----------------|
| DC_41A_n41A <sup>1</sup>  | 6.6.3.3.19 and 6.6.2.2.2 of [4] and 6.5.2.3.2 and 6.5.3.3.1 of [2] | NS_01 or NS_04                  | NS_04                       | 6.2B.3.2.1     |
| NOTE 1: Only applies to UEs that support dual UL transmission for this EN-DC combination.   |  |                                 |                             |                |
| NOTE 2: The requirement applies when the combination of network signalling values in the two CGs is set (only for UEs configured with EN-DC). |  |                                 |                             |                |

### 6.2B.3.2.1 A-MPR for NS\_04

When the UE is configured for B41/n41 intra-band non-contiguous EN-DC and it receives IE NS\_04, the UE determines the total allowed maximum output power reduction as specified in this clause. The A-MPR for EN-DC defined in this clause is used instead of MPR defined in 6.2B.2.2, not additively, so EN-DC MPR=0 when NS\_04 is signaled.

For UE supporting dynamic power sharing the following:

- for the MCG,  $A\text{-MPR}_c$  in accordance with TS 36.101 [4]
- for the SCG,

$$A\text{-MPR}'_c = A\text{-MPR}_{\text{NR}} = \text{MAX}(A\text{-MPR}_{\text{single, NR}}, A\text{-MPR}_{\text{EN-DC}})$$

- for the total configured transmission power,

$$A\text{-MPR}_{\text{tot}} = P_{\text{PowerClass, EN-DC}} - \min(P_{\text{PowerClass, EN-DC}}, 10 * \log_{10}(10^{(P_{\text{PowerClass, E-UTRA}} - A\text{-MPR}_{\text{E-UTRA}})/10}) + 10^{(P_{\text{PowerClass, NR}} - A\text{-MPR}_{\text{NR}})/10}))$$

where

$$A\text{-MPR}_{E\text{-UTRA}} = \text{MAX}( A\text{-MPR}_{\text{single},E\text{-UTRA}} + \text{MPR}_{\text{single},E\text{-UTRA}}, A\text{-MPR}_{\text{EN-DC}} )$$

$$A\text{-MPR}_{\text{EN-DC}} = \text{MAX}(A\text{-MPR}_{\text{IM3}}, A\text{-MPR}_{\text{ACLRoverlap}} )$$

with

- $A\text{-MPR}_{\text{single}, E\text{-UTRA}}$  is the A-MPR defined for the E-UTRA transmission in TS 36.101 [4]
- $A\text{-MPR}_{\text{single}, \text{NR}}$  is the A-MPR defined for the NR transmission in TS 38.101-1 [2]
- $\text{MPR}_{\text{single}, E\text{-UTRA}}$  is the MPR defined for the E-UTRA transmission in TS 36.101 [4]

For UEs not supporting dynamic power sharing the following

- for the MCG,

$$A\text{-MPR}_c = \text{MAX}( A\text{-MPR}_{\text{single}, E\text{-UTRA}} + \text{MPR}_{\text{single}, E\text{-UTRA}}, A\text{-MPR}_{\text{IM3}}, A\text{-MPR}_{\text{ACLRoverlap}} )$$

- for the SCG,

$$A\text{-MPR}'_c = \text{MAX}( A\text{-MPR}_{\text{single}, \text{NR}}, A\text{-MPR}_{\text{IM3}}, A\text{-MPR}_{\text{ACLRoverlap}} )$$

where

- $A\text{-MPR}_{\text{single}, E\text{-UTRA}}$  is the A-MPR defined for the E-UTRA transmission in TS 36.101 [4]
- $A\text{-MPR}_{\text{single}, \text{NR}}$  is the A-MPR defined for the NR transmission in TS 38.101-1 [2]
- $\text{MPR}_{\text{single}, E\text{-UTRA}}$  is the MPR defined for the E-UTRA transmission in TS 36.101 [4]

The UE determines the Channel Configuration Case and the value of  $A\text{-MPR}_{\text{IM3}}$  as follows:

If  $\text{AND}( F_{\text{IM3}, \text{low\_block}, \text{high}} < F_{\text{filter}, \text{low}}, \text{MAX}( \text{SEM}_{-13, \text{high}}, F_{\text{IM3}, \text{high\_block}, \text{low}} ) > F_{\text{filter}, \text{high}} )$

Channel Configuration Case C.  $A\text{-MPR}_{\text{IM3}}$  defined in Clause 6.2B.3.1.2.1

Else

Channel Configuration Case D.  $A\text{-MPR}_{\text{IM3}}$  defined in Clause 6.2B.3.1.2.2

where

- $F_{\text{IM3}, \text{low\_block}, \text{high}} = (2 * F_{\text{low\_channel}, \text{high\_edge}}) - F_{\text{high\_channel}, \text{low\_edge}}$
- $F_{\text{IM3}, \text{high\_block}, \text{low}} = (2 * F_{\text{high\_channel}, \text{low\_edge}}) - F_{\text{low\_channel}, \text{high\_edge}}$
- $F_{\text{low\_channel}, \text{low\_edge}}$  is the lowermost frequency of lower transmission bandwidth configuration.
- $F_{\text{low\_channel}, \text{high\_edge}}$  is the uppermost frequency of lower transmission bandwidth configuration.
- $F_{\text{high\_channel}, \text{low\_edge}}$  is the lowermost frequency of upper transmission bandwidth configuration.
- $F_{\text{high\_channel}, \text{high\_edge}}$  is the uppermost frequency of upper transmission bandwidth configuration.
- $F_{\text{filter}, \text{low}} = 2480$  MHz
- $F_{\text{filter}, \text{high}} = 2745$  MHz
- $\text{SEM}_{-13, \text{high}} =$  Threshold frequency where upper spectral emission mask for upper channel drops from -13 dBm / 1MHz to -25 dBm / 1MHz, as specified in Clause 6.6.2.2.2 in [4] and Clause 6.5.2.3.2 in [2] respectively.

Where the transmission bandwidth configuration for NR is the maximum frequency span covering all the configured SCSSpecificCarrier for scenarios that carrier bandwidths with different SCS can be fully overlapped.

The UE determines the value of  $A\text{-MPR}_{\text{ACLRoverlap}}$  as specified in Table 6.2B.3.2.1-1:

**Table 6.2B.3.2.1-1: A-MPR<sub>ACL</sub>Overlap**

| $W_{\text{gap}}$   | A-MPR <sub>ACL</sub> Overlap |
|--|------------------------------|
| $< BW_{\text{channel,E-UTRA}} + BW_{\text{channel,NR}}$  | 4 dB                         |
| $\geq BW_{\text{channel,E-UTRA}} + BW_{\text{channel,NR}}$   | 0 dB                         |
| NOTE 1: $W_{\text{gap}} = F_{\text{high\_channel,low\_edge}} - F_{\text{low\_channel,high\_edge}}$ |                              |

### 6.2B.3.3 Inter-band EN-DC within FR1

For inter-band EN-DC between E-UTRA and FR1 NR, UE additional maximum output power reduction specified in TS 36.101 [4] and TS 38.101-1 [2] apply for E-UTRA and NR respectively.

Unless specified in Table 6.2B.3.3-1, for inter-band carrier aggregation with uplink assigned to LTE and NR bands, the requirements in [2] clause 6.2.3 apply for NR uplink component carrier and the requirements in [4] clause 6.2.4 apply for LTE uplink component carrier.

Unless otherwise stated, for inter-band EN-DC with uplink assigned to LTE and NR bands and specified in Table 6.2B.3.3-1, the combined requirements and allowed A-MPR are applicable on both LTE and NR bands when LTE and NR component carriers are active. The requirements in Table 6.2B.3.3-1 are specified in terms of an additional spectrum emission requirement. The emission requirements specified in Table 6.2B.3.3-1 also apply for the frequency ranges that are less than  $F_{\text{OOB}}$  (MHz) from the edge of the channel bandwidth specified in TS 36.101 [4] and TS 38.101-1 [2], respectively.

**Table 6.2B.3.3-1: Additional Requirements for inter-band EN-DC (two-bands)**

| NR CA combination                      | Band | Applied NS | Requirements (clause) (TS 36.101 [4]) | Requirements (clause) (TS 38.101-1 [2]) | A-MPR (table/clause) (TS 36.101 [4]) | A-MPR (table/clause) (TS 38.101-1 [2]) | Note |
|--|------|------------|---------------------------------------|---|--------------------------------------|--|------|
| DC_1_n28                               | 1    | 05         | 6.6.3.3.1                             | N/A                                     | Table 6.2.4-1 (NS_05)                | N/A                                    | 2    |
|  | n28  | 17         | N/A                                   | 6.5.3.3.2                               | N/A                                  | N/A                                    |      |
| DC_1_n40                               | 1    | 05         | 6.6.3.3.1                             | N/A                                     | Table 6.2.4-1 (NS_05)                | N/A                                    |      |
| DC_1_n77                               | 1    | 05         | 6.6.3.3.1                             | N/A                                     | Table 6.2.4-1 (NS_05)                | N/A                                    | 1    |
|  | n84  | 05         | N/A                                   | 6.5.3.3.4                               | N/A                                  | Clause 6.2.3.4                         |      |
|  |      | 05U        | N/A                                   | 6.5.3.3.4                               | N/A                                  | Clause 6.2.3.4                         |      |
| DC_1_n78<br>DC_1_n84_ULSUP-<br>TDM_n78 | 1    | 05         | 6.6.3.3.1                             | N/A                                     | Table 6.2.4-1 (NS_05)                | N/A                                    | 1    |
|  | n84  | 05         | N/A                                   | 6.5.3.3.4                               | N/A                                  | Clause 6.2.3.4                         |      |
|  |      | 05U        | N/A                                   | 6.5.3.3.4, 6.5.2.4.2                    | N/A                                  | Clause 6.2.3.4                         |      |
| DC_1_n79                               | 1    | 05         | 6.6.3.3.1                             | N/A                                     | Table 6.2.4-1 (NS_05)                | N/A                                    | 1    |
|  | n84  | 05         | N/A                                   | 6.5.3.3.4                               | N/A                                  | Clause 6.2.3.4                         |      |
|  |      | 05U        | N/A                                   | 6.5.3.3.4, 6.5.2.4.2                    | N/A                                  | Clause 6.2.3.4                         |      |
| DC_3_n1                                | n1   | 05         | N/A                                   | 6.5.3.3.4                               | N/A                                  | Clause 6.2.3.4                         | 1    |
|  |      | 05U        | N/A                                   | 6.5.3.3.4, 6.5.2.4.2                    | N/A                                  | Clause 6.2.3.4                         |      |
| DC_3_n28                               | n28  | 17         | N/A                                   | 6.5.3.3.2                               | N/A                                  | N/A                                    | 2    |
| DC_19_n77                              | 19   | 08         | 6.6.3.3.3                             | N/A                                     | Table 6.2.4-1 (NS_08)                | N/A                                    |      |
| DC_19_n78                              | 19   | 08         | 6.6.3.3.3                             | N/A                                     | Table 6.2.4-1 (NS_08)                | N/A                                    |      |
| DC_19_n79                              | 19   | 08         | 6.6.3.3.3                             | N/A                                     | Table 6.2.4-1 (NS_08)                | N/A                                    |      |
| DC_21_n77                              | 21   | 09         | 6.6.3.3.4                             | N/A                                     | Table 6.2.4-1 (NS_09)                | N/A                                    |      |
| DC_21_n78                              | 21   | 09         | 6.6.3.3.4                             | N/A                                     | Table 6.2.4-1 (NS_09)                | N/A                                    |      |
| DC_21_n79                              | 21   | 09         | 6.6.3.3.4                             | N/A                                     | Table 6.2.4-1 (NS_09)                | N/A                                    |      |
| DC_28_n77                              | 28   | 17         | 6.6.3.3.10                            | N/A                                     | Table 6.2.4-1 (NS_17)                | N/A                                    | 2    |
| DC_28_n78                              | 28   | 17         | 6.6.3.3.10                            | N/A                                     | Table 6.2.4-1 (NS_17)                | N/A                                    | 2    |

|   |    |    |            |     |                          |     |   |
|---|----|----|------------|-----|--------------------------|-----|---|
| DC_28_n79   | 28 | 17 | 6.6.3.3.10 | N/A | Table 6.2.4-1<br>(NS_17) | N/A | 2 |
| NOTE 1: NS_05U, NS_43U and NS_100 can be signalled for NR bands that have UTRA services deployed and protected range is specified in clause 6.5.2.4.2 of TS38.101-1[2] and the requirements in clause 6.5.2.4.2 are only applicable to the signalling band. |    |    |            |     |                          |     |   |
| 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.  |    |    |            |     |                          |     |   |

### 6.2B.3.3A Inter-band NE-DC within FR1

Unless specified in Table 6.2B.3.3A-1, for inter-band carrier aggregation with uplink assigned to LTE and NR bands, the requirements in [2] clause 6.2.3 apply for NR uplink component carrier and the requirements in [4] clause 6.2.4 apply for LTE uplink component carrier.

Unless otherwise stated, for inter-band EN-DC with uplink assigned to LTE and NR bands and specified in Table 6.2B.3.3A-1, the combined requirements and allowed A-MPR are applicable on both LTE and NR bands when LTE and NR component carriers are active. The requirements in Table 6.2B.3.3A-1 are specified in terms of an additional spectrum emission requirement. The emission requirements specified in Table 6.2B.3.3A-1 also apply for the frequency ranges that are less than  $F_{OOB}$  (MHz) from the edge of the channel bandwidth specified in TS 36.101 [4] and TS 38.101-1 [2], respectively.

**Table 6.2B.3.3A-1: Additional Requirements for inter-band NE-DC (two-bands)**

| NR CA combination  | Band | Applied NS | Requirements (clause) (TS 36.101 [4]) | Requirements (clause) (TS 38.101-1 [2]) | A-MPR (table/clause) (TS 36.101 [4]) | A-MPR (table/clause) (TS 38.101-1 [2]) | Note |
|--|------|------------|---------------------------------------|---|--------------------------------------|--|------|
| DC_n1_28   | n1   | 05         | N/A                                   | 6.5.3.3.4                               | N/A                                  | Clause 6.2.3.4                         | 1, 2 |
|  |      | 05U        | N/A                                   | 6.5.3.3.4, 6.5.2.4.2                    | N/A                                  | Clause 6.2.3.4                         |      |
|  | 28   | 17         | 6.6.3.3.10                            | N/A                                     | Table 6.2.4-1 (NS_17)                | N/A                                    |      |
| NOTE 1: NS_05U can be signalled for NR bands that have UTRA services deployed and protected range is specified in clause 6.5.2.4.2 of TS38.101-1[2] and the requirements in clause 6.5.2.4.2 are only applicable to the signalling band. |      |            |                                       |   |                                      |  |      |
| 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.   |      |            |                                       |   |                                      |  |      |

### 6.2B.3.4 Inter-band EN-DC including FR2

UE additional maximum output power reduction requirement for E-UTRA single carrier and CA operation specified in clauses 6.2.4 and 6.2.4A of TS 36.101 [4] and for NR single carrier, CA operation and UL-MIMO specified in clause 6.2.3, 6.2A.3 and 6.2D.3 of TS 38.101-2 [3] apply.

### 6.2B.3.5 Inter-band EN-DC including both FR1 and FR2

UE additional maximum output power reduction requirement for E-UTRA single carrier and CA operation specified in clauses 6.2.4 and 6.2.4A of TS 36.101 [4] and for NR single carrier specified in clause 6.2.3 of TS 38.101-1 [2] and for NR single carrier, CA operation and UL-MIMO specified in clause 6.2.3, 6.2A.3, and 6.2D.3 of TS 38.101-2 [3] apply.

## 6.2B.4 Configured output power for DC

### 6.2B.4.1 Configured output power level

#### 6.2B.4.1.1 Intra-band contiguous EN-DC

The following requirements apply for one component carrier per CG configured for synchronous DC.

For intra-band dual connectivity with one uplink serving cell per CG on E-UTRA and NR respectively, the UE is allowed to set its configured maximum output power  $P_{CMAX,c(i),i}$  for serving cell  $c(i)$  of CG  $i$ ,  $i = 1, 2$ , and its total

configured maximum transmission power for EN-DC operation  $P_{Total}^{EN-DC} = 10\log_{10}(\hat{P}_{total}^{EN-DC})$  with  $\hat{P}_{total}^{EN-DC}$  as specified in clause 7.6 of TS 38.213 [10].

The configured maximum output power  $P_{CMAX\_E-UTRA,c}(p)$  in sub-frame  $p$  for the configured E-UTRA uplink carrier shall be set within the bounds:

$$P_{CMAX\_L\_E-UTRA,c}(p) \leq P_{CMAX\_E-UTRA,c}(p) \leq P_{CMAX\_H\_E-UTRA,c}(p)$$

where  $P_{CMAX\_L\_E-UTRA,c}$  and  $P_{CMAX\_H\_E-UTRA,c}$  are the limits for a serving cell  $c$  as specified in TS 36.101 [4] clause 6.2.5 modified by  $P_{LTE}$  as follows:

$$P_{CMAX\_L\_E-UTRA,c} = \text{MIN} \{ \text{MIN}(P_{EMAX,c}, P_{EMAX, EN-DC}, P_{LTE}) - \Delta t_{C\_E-UTRA,c}, (P_{PowerClass, EN-DC} - \Delta P_{PowerClass, EN-DC}), (P_{PowerClass, E-UTRA} - \Delta P_{PowerClass, E-UTRA}) - \text{MAX}(MPR_c + A-MPR_c + \Delta T_{IB,c} + \Delta T_{C\_E-UTRA,c} + \Delta T_{ProSe}, P-MPR_c) \}$$

$$P_{CMAX\_H\_E-UTRA,c} = \text{MIN} \{ P_{EMAX,c}, P_{EMAX, EN-DC}, P_{LTE}, P_{PowerClass, EN-DC}, P_{PowerClass, E-UTRA} - \Delta P_{PowerClass, E-UTRA} \}$$

where

- $P_{EMAX, EN-DC}$  is the value given by the field *p-maxUE-FR1* of the *RRCConnectionReconfiguration-v1530* IE as defined in TS 36.331 [8];
- $P_{LTE}$  is the value given by the field *p-maxEUTRA-r15* of the *RRCConnectionReconfiguration-v1510* IE as defined in TS 36.331 [8] which is the same as  $P_{LTE}$  in TS 38.213 [10];
- $\Delta t_{C\_EUTRA,c} = 1.5$  dB when NOTE 2 in Table 6.2.2-1 of TS 36.101 [4] applies;  $\Delta t_{C\_EUTRA,c} = 0$  dB otherwise;

and whenever NS\_01 is not indicated within CG 1:

- for a UE indicating support of dynamicPowerSharing, the  $MPR_c$  and the  $A-MPR_c$  are determined in accordance with the DCI of serving cell  $c$  of the CG 1 and the specification in clause 6.2.4 of TS 36.101 [4];
- for a UE not indicating support of dynamicPowerSharing, the  $A-MPR_c$  is determined in accordance with clause 6.2B.3.1 with parameters applicable for UEs not indicating support of dynamicPowerSharing and  $MPR_c = 0$  dB;

and whenever NS\_01 is indicated in CG 1:

- for a UE indicating support of dynamicPowerSharing, the  $MPR_c$  is determined in accordance with the DCI of serving cell  $c$  of the CG 1 and the specification in clause 6.2.4 of TS 36.101 [4];
- for a UE not indicating support of dynamicPowerSharing, the  $MPR_c$  is determined in accordance with clause 6.2B.2.1 with parameters applicable for UEs not indicating support of dynamicPowerSharing and  $A-MPR_c = 0$  dB;

The configured maximum output power  $P_{CMAX\_f,c, NR}(q)$  in physical channel  $q$  for the configured NR carrier shall be set within the bounds:

$$P_{CMAX\_L\_f,c, NR}(q) \leq P_{CMAX\_f,c, NR}(q) \leq P_{CMAX\_H\_f,c, NR}(q)$$

where  $P_{CMAX\_L\_f,c, NR}$  and  $P_{CMAX\_H\_f,c, NR}$  are the limits for a serving cell  $c$  as specified in clause 6.2.4 of TS 38.101-1 [2] modified as follows:

$$P_{CMAX\_L\_f,c, NR} = \text{MIN} \{ \text{MIN}(P_{EMAX,c}, P_{EMAX, EN-DC}, P_{NR}) - \Delta T_{C\_NR,c}, (P_{PowerClass, EN-DC} - \Delta P_{PowerClass, EN-DC}), (P_{PowerClass, NR} - \Delta P_{PowerClass, NR}) - \text{MAX}(\text{MAX}(MPR_c, A-MPR_c) + \Delta T_{IB,c} + \Delta T_{C\_NR,c} + \Delta T_{RxsRS}, P-MPR_c) \}$$

$$P_{CMAX\_H\_f,c, NR} = \text{MIN} \{ P_{EMAX,c}, P_{EMAX, EN-DC}, P_{NR}, P_{PowerClass, EN-DC}, P_{PowerClass, NR} - \Delta P_{PowerClass, NR} \}$$

where

- $P_{EMAX, EN-DC}$  is the value given by the field *p-maxUE-FR1* of the *RRCConnectionReconfiguration-v1530* IE as defined in TS 36.331 [8];
- $P_{LTE}$  signalled by RRC as *p-MaxEUTRA-r15* in TS 36.331 [8];
- $P_{NR}$  is the value given by the field *p-NR-FR1* of the *PhysicalCellGroupConfig* IE as defined in [9] and signalled by RRC;

- $\Delta T_{c,E-UTRA,c} = 1.5\text{dB}$  when NOTE 2 in Table 6.2.2-1 in TS 36.101 [4] applies for a serving cell  $c$ , otherwise  $\Delta T_{c,E-UTRA,c} = 0\text{dB}$ ;
- $\Delta T_{c,NR,c} = 1.5\text{dB}$  when NOTE 3 in Table 6.2.1-1 in TS 38.101-1 [2] applies for a serving cell  $c$ , otherwise  $\Delta T_{c,NR,c} = 0\text{dB}$ ;
- $\Delta T_{IB,c}$  specified in clause 6.2B.4.2.1 for EN-DC, the individual Power Class defined in table 6.2B.1.1 and any other additional power reductions parameters specified in clauses 6.2B.2 and 6.2B.3 for EN-DC are applicable to  $P_{\text{CMAX}_E-UTRA,c}$  and  $P_{\text{CMAX}_E,c,NR}$  evaluations.
- $P_{\text{PowerClass,EN-DC}}$  is defined in clause 6.2B.1.1 for intra-band contiguous EN-DC;
- $P_{\text{PowerClass,NR}}$  is the nominal UE power of the power class that the UE supports for the NR band of the EN-DC combination as defined in clause 6.2.1 of 38.101-1 [2];
- $P_{\text{PowerClass,E-UTRA}}$  is the nominal UE power of the power class that the UE supports for the E-UTRA band of the EN-DC combination as defined in clause 6.2.2 of 36.101 [4];
- $\Delta P_{\text{PowerClass,EN-DC}}$  is 3 dB for a power class 2 capable EN-DC UE when LTE UL/DL configuration is 0 or 6; or LTE UL/DL configuration is 1 and special subframe configuration is 0 or 5;  $\Delta P_{\text{PowerClass,EN-DC}} = 3\text{ dB}$  when the IE *p-maxUE-FR1* as defined in TS 36.331 [8] is provided and set to the maximum output power of the default power class or lower; otherwise  $\Delta P_{\text{PowerClass,EN-DC}} = 0\text{ dB}$ ;

and whenever NS\_01 is not indicated within CG 2:

- for a UE indicating support of dynamicPowerSharing,  $A\text{-MPR}_c = A\text{-MPR}'_c$  with  $A\text{-MPR}'_c$  determined in accordance with clause 6.2B.3.1 and  $\text{MPR}_c = 0\text{ dB}$  if transmission(s) in subframe  $p$  on CG 1 overlap in time with physical channel  $q$  on CG 2;
- for a UE indicating support of dynamicPowerSharing,  $A\text{-MPR}_c$  is determined in accordance with TS 38.101-1 [2] if transmission(s) in subframe  $p$  on CG 1 does not overlap in time with physical channel  $q$  on CG 2;
- for a UE not indicating support of dynamicPowerSharing, the  $A\text{-MPR}_c$  is determined in accordance with clause 6.2B.3.1 with parameters applicable for UEs not indicating support of dynamicPowerSharing and  $\text{MPR}_c = 0\text{ dB}$ ;

and whenever NS\_01 is indicated in CG 2.

- for a UE indicating support of dynamicPowerSharing,  $\text{MPR}_c = \text{MPR}'_c$  with  $\text{MPR}'_c$  determined in accordance with clause 6.2B.2.1 and  $A\text{-MPR}_c = 0\text{ dB}$  if transmission(s) in subframe  $p$  on CG 1 overlap in time with physical channel  $q$  on CG 2;
- for a UE indicating support of dynamicPowerSharing,  $\text{MPR}_c$  is determined in accordance with TS 38.101-1 [2] if transmission(s) in subframe  $p$  on CG 1 does not overlap in time with physical channel  $q$  on CG 2;
- for a UE not indicating support of dynamicPowerSharing, the  $\text{MPR}_c$  is determined in accordance with clause 6.2B.2.1 with parameters applicable for UEs not indicating support of dynamicPowerSharing and  $A\text{-MPR}_c = 0\text{ dB}$ ;

If the transmissions from NR and E-UTRA do not overlap, then the complete clauses for configured transmitted power for E-UTRA and NR respectively from their own specifications apply with the modifications specified above. The lower value between  $P_{\text{PowerClass,EN-DC}}$  or  $P_{\text{EMAX,EN-DC}}$  shall not be exceeded at any time by UE.

If the EN-DC UE is not supporting dynamic power sharing, then the complete clauses for configured transmitted power for E-UTRA and NR respectively from their own specifications TS 36.101 [4] and TS 38.101-1 [2] respectively apply with the modifications specified above.

If the UE does not support dynamic power sharing,

$$P_{\text{Total}}^{\text{EN-DC}} = \text{MIN} \{ P_{\text{EMAX,EN-DC}}, P_{\text{PowerClass,EN-DC}} - \Delta P_{\text{PowerClass,EN-DC}} \} + 0.3\text{ dB}$$

For UEs indicating support of dynamicPowerSharing in the *UE-MRDC-Capability* IE the UE can configure the total maximum transmission power  $P_{\text{Total}}^{\text{EN-DC}}$  within the range

$$P_{\text{EN-DC,tot,L}} \leq P_{\text{Total}}^{\text{EN-DC}} \leq P_{\text{EN-DC,tot,H}}$$



where

$$P_{\text{EN-DC,tot,L}}(p,q) = \text{MIN} \{ P_{\text{PowerClass,EN-DC}} - \Delta P_{\text{PowerClass,EN-DC}} - \text{MAX} \{ \text{MPR}_{\text{tot}}, \text{A-MPR}_{\text{tot}} \}, P_{\text{EMAX,EN-DC}} \}$$

$$P_{\text{EN-DC,tot,H}}(p,q) = \text{MIN} \{ P_{\text{PowerClass,EN-DC}}, P_{\text{EMAX,EN-DC}} \}$$

for sub-frame  $p$  on CG 1 overlapping with physical channel  $q$  on CG 2 and with  $\text{MPR}_{\text{tot}}$  and  $\text{A-MPR}_{\text{tot}}$  in accordance with 6.2B.2.1 and clause 6.2B.3.1, respectively.

The measured total maximum output power  $P_{\text{UMAX}}$  over both CGs/RATs, measured over the transmission reference time duration is

$$P_{\text{UMAX}} = 10 \log_{10} [p_{\text{UMAX,c,E-UTRA}} + p_{\text{UMAX,f,c,NR}}],$$

where  $p_{\text{UMAX,c,E-UTRA}}$  and  $p_{\text{UMAX,c,NR}}$  denotes the measured output power of serving cell  $c$  for *E-UTRA* and *NR* respectively, expressed in linear scale.

For UEs indicating support of dynamicPowerSharing, the measured total configured maximum output power  $P_{\text{UMAX}}$  shall be within the following bounds:

$$P_{\text{CMAX,L}} - T_{\text{LOW}}(P_{\text{CMAX,L}}) \leq P_{\text{UMAX}} \leq P_{\text{CMAX,H}} + T_{\text{HIGH}}(P_{\text{CMAX,H}})$$

with the tolerances  $T_{\text{LOW}}(P_{\text{CMAX,L}})$  and  $T_{\text{HIGH}}(P_{\text{CMAX,H}})$  for applicable values of  $P_{\text{CMAX,L}}$  and  $P_{\text{CMAX,H}}$  specified in Table 6.2B.4.1.1-2.

When an UL subframe transmission  $p$  from E-UTRA overlap with a physical channel  $q$  from the NR, then for  $P_{\text{UMAX}}$  evaluation, the E-UTRA subframe  $p$  is taken as reference period  $T_{\text{REF}}$  and always considered as the reference measurement duration and the following rules are applicable.

$T_{\text{REF}}$  and  $T_{\text{eval}}$  are specified in Table 6.2B.4.1.1-1 when same or different subframes and physical channel durations are used in aggregated carriers.  $P_{\text{PowerClass,EN-DC}}$  shall not be exceeded by the UE during any evaluation period of time.

**Table 6.2B.4.1.1-1:  $P_{\text{CMAX}}$  evaluation window**

| transmission duration                                     | $T_{\text{REF}}$ | $T_{\text{eval}}$  |
|---|------------------|--|
| Different transmission duration in different RAT carriers | E-UTRA Subframe  | $\text{Min}(T_{\text{no\_hopping}}, \text{Physical Channel Length})$ |

For each  $T_{\text{REF}}$ , the  $P_{\text{CMAX,H}}$  is evaluated per  $T_{\text{eval}}$  and given by the maximum value over the transmission(s) within the  $T_{\text{eval}}$  as follows:

$$P_{\text{CMAX,H}} = \text{MAX} \{ P_{\text{CMAX,EN-DC,H}}(p,q), P_{\text{CMAX,EN-DC,H}}(p,q+1), \dots, P_{\text{CMAX,EN-DC,H}}(p,q+n) \}$$

where  $P_{\text{CMAX,EN-DC,H}}$  are the applicable upper limits for each overlapping scheduling unit pairs  $(p,q)$ ,  $(p,q+1)$ , up to  $(p,q+n)$  for each applicable  $T_{\text{eval}}$  duration, where  $q+n$  is the last NR UL physical channel overlapping with E-UTRA subframe  $p$ .

While  $P_{\text{CMAX,L}}$  is computed as follows:

$$P_{\text{CMAX,L}} = \text{MIN} \{ P_{\text{CMAX,EN-DC,L}}(p,q), P_{\text{CMAX,EN-DC,L}}(p,q+1), \dots, P_{\text{CMAX,EN-DC,L}}(p,q+n) \}$$

where  $P_{\text{CMAX,EN-DC,L}}$  are the applicable lower limits for each overlapping scheduling unit pairs  $(p,q)$ ,  $(p,q+1)$ , up to  $(p,q+n)$  for each applicable  $T_{\text{eval}}$  duration, where  $q+n$  is the last NR UL physical channel overlapping with E-UTRA subframe  $p$ ,

With

$$P_{\text{CMAX,EN-DC,H}}(p,q) = \text{MIN} \{ 10 \log_{10} [p_{\text{CMAX,H,E-UTRA,c}}(p) + p_{\text{CMAX,H,f,c,NR}}(q)], P_{\text{EMAX,EN-DC}}, P_{\text{PowerClass,EN-DC}} \}$$

And:

$$a = 10 \log_{10} [p_{\text{CMAX,E-UTRA,c}}(p) + p_{\text{CMAX,f,c,NR}}(q)] > P_{\text{EN-DC,tot,L}}$$

$$b = 10 \log_{10} [p_{\text{CMAX,E-UTRA,c}}(p) + p_{\text{CMAX,f,c,NR}}(q) / X_{\text{scale}}] > P_{\text{EN-DC,tot,L}}$$

If a= FALSE and the configured transmission power spectral density between the MCG and SCG differs by less than 6 dB

$$P_{\text{CMAX\_EN-DC\_L}}(p,q) = \text{MIN} \{ 10 \log_{10} [p_{\text{CMAX\_L\_E-UTRA,c}}(p) + p_{\text{CMAX\_L,f,c, NR}}(q)], P_{\text{EMAX, EN-DC}}, P_{\text{PowerClass, EN-DC}} - \Delta P_{\text{PowerClass, EN-DC}} \}$$

ELSE If (a=TRUE) AND (b=FALSE) and the configured transmission power spectral density between the MCG and SCG differs by less than 6 dB

$$P_{\text{CMAX\_EN-DC\_L}}(p,q) = \text{MIN} \{ 10 \log_{10} [p_{\text{CMAX\_L\_E-UTRA,c}}(p) + p_{\text{CMAX\_L,f,c, NR}}(q) / X_{\text{scale}} ], P_{\text{EMAX, EN-DC}}, P_{\text{PowerClass, EN-DC}} - \Delta P_{\text{PowerClass, EN-DC}} \}$$

ELSE If b= TRUE or the transmission power after power scaling spectral density between the MCG and SCG differs by more than 6 dB

$$P_{\text{CMAX\_EN-DC\_L}}(p,q) = \text{MIN} \{ 10 \log_{10} [p_{\text{CMAX\_L\_E-UTRA,c}}(p) ], P_{\text{EMAX, EN-DC}}, P_{\text{PowerClass, EN-DC}} - \Delta P_{\text{PowerClass, EN-DC}} \}$$

where

- $p_{\text{CMAX\_H\_E-UTRA,c}}(p)$  is the E-UTRA higher limit of the maximum configured power expressed in linear scale;
- $p_{\text{CMAX\_H,f,c, NR}}(q)$  is the NR higher limit of the maximum configured power expressed in linear scale;
- $p_{\text{CMAX\_L\_E-UTRA,c}}(p)$  is the E-UTRA lower limit of the maximum configured power expressed in linear scale;
- $p_{\text{CMAX\_L,f,c, NR}}(q)$  is the NR lower limit of the maximum configured power expressed in linear scale;
- $P_{\text{PowerClass, EN-DC}}$  is defined in clause 6.2B.1.1 for intra-band EN-DC;
- $X_{\text{scale}}$  is the linear value of X dB which is configured by RRC and can only take values [0 , 6] dB
- $p_{\text{CMAX\_E-UTRA,c}}(p)$  is the linear value of  $P_{\text{CMAX\_E-UTRA,c}}(p)$ , the real configured max power for E-UTRA
- $p_{\text{CMAX,f,c NR}}(q)$  is the linear value of  $P_{\text{CMAX,f,c, NR}}(q)$ , the real configured max power of NR

**Table 6.2B.4.1.1-2: P<sub>CMAX</sub> tolerance for Dual Connectivity E-UTRA-NR**

| P <sub>CMAX</sub> (dBm)      | Tolerance T <sub>LOW</sub> (P <sub>CMAX_L</sub> ) (dB) | Tolerance T <sub>HIGH</sub> (P <sub>CMAX_H</sub> ) (dB) |
|------------------------------|--|---|
| 23 ≤ P <sub>CMAX</sub> ≤ 33  | 3.0  | 2.0   |
| 22 ≤ P <sub>CMAX</sub> < 23  | 5.0  | 2.0   |
| 21 ≤ P <sub>CMAX</sub> < 22  | 5.0  | 3.0   |
| 20 ≤ P <sub>CMAX</sub> < 21  | 6.0  | 4.0   |
| 16 ≤ P <sub>CMAX</sub> < 20  | 5.0  |   |
| 11 ≤ P <sub>CMAX</sub> < 16  | 6.0  |   |
| -40 ≤ P <sub>CMAX</sub> < 11 | 7.0  |   |

If the UE supports dynamic power sharing, and when E-UTRA and NR transmissions overlap and the condition (If (a=TRUE) AND (b=FALSE)) is met, SCG shall be transmitted and the following supplementary minimum requirement apply for the measured SCG power, P<sub>UMAX,f,c, NR</sub>(q), under nominal conditions and unless otherwise stated

$$10\log(p_{\text{CMAX\_L,f,c, NR}}(q)/X_{\text{scale}}) - T_{\text{LOW}}(10\log(p_{\text{CMAX\_L,f,c, NR}}(q)/X_{\text{scale}})) \leq P_{\text{UMAX,f,c, NR}}(q) \leq 10\log(p_{\text{CMAX\_H,f,c, NR}}(q)) + T_{\text{HIGH}}(10\log(p_{\text{CMAX\_H,f,c, NR}}(q)))$$

with the tolerances T<sub>LOW</sub> and T<sub>HIGH</sub> for applicable values of P<sub>CMAX</sub> specified in Table 6.2B.4.1.1-2.

If the UE supports dynamic power sharing, the measured maximum output power in subframe p on CG 1, p<sub>UMAX,c,E-UTRA</sub>, shall meet the requirements in clause 6.2.5 in TS 36.101 [4] with the limits P<sub>CMAX\_L,c</sub> and P<sub>CMAX\_H,c</sub> replaced by P<sub>CMAX\_L\_L\_E-UTRA,c</sub> and P<sub>CMAX\_H\_E-UTRA,c</sub> as specified above, respectively.

If the configured transmission power spectral density between the MCG and SCG differs by more than 6 dB, then

$$P_{\text{UMAX,f,c, NR}}(q) \leq 10\log(p_{\text{CMAX\_H,f,c, NR}}(q)) + T_{\text{HIGH}}(10\log(p_{\text{CMAX\_H,f,c, NR}}(q))).$$

### 6.2B.4.1.2 Intra-band non-contiguous EN-DC

The following requirements apply for one component carrier per CG configured for synchronous DC. The CG(s) are indexed by  $j = 1$  for MCG and  $j = 2$  for SCG.

The configured maximum output power  $P_{\text{CMAX\_E-UTRA},c}(p)$  in sub-frame  $p$  for the configured E-UTRA uplink carrier shall be set in accordance with clause 6.2B.4.1.1 but where

- for a UE not indicating support of dynamicPowerSharing, the  $A\text{-MPR}_c$  determined in accordance with clause 6.2B.3.2 with parameters applicable for UEs not indicating support of dynamicPowerSharing and  $\text{MPR}_c = 0$  dB;

whenever NS\_01 is not indicated within CG 1 while

- for a UE not indicating support of dynamicPowerSharing, the  $\text{MPR}_c$  determined in accordance with clause 6.2B.2.2 with parameters applicable for UEs not indicating support of dynamicPowerSharing and  $A\text{-MPR}_c = 0$  dB;

whenever NS\_01 is indicated in CG 1.

The configured maximum output power  $P_{\text{CMAX},f,c,\text{NR}}(q)$  in physical channel  $q$  for the configured NR carrier shall be set in accordance with clause 6.2B.4.1.1 but where

- for a UE indicating support of dynamicPowerSharing,  $A\text{-MPR}_c = A\text{-MPR}'_c$  with  $A\text{-MPR}'_c$  determined in accordance with clause 6.2B.3.2 and  $\text{MPR}_c = 0$  dB if transmission(s) in subframe  $p$  on CG 1 overlap in time with physical channel  $q$  on CG 2;
- for a UE indicating support of dynamicPowerSharing,  $A\text{-MPR}_c$  is determined in accordance with TS 38.101-1 [2] if transmission(s) in subframe  $p$  on CG 1 does not overlap in time with physical channel  $q$  on CG 2;
- for a UE not indicating support of dynamicPowerSharing, the  $A\text{-MPR}_c$  is determined in accordance with clause 6.2B.3.2 with parameters applicable for UEs not indicating support of dynamicPowerSharing and  $\text{MPR}_c = 0$  dB;

whenever NS\_01 is not indicated in CG 2 while

- for a UE indicating support of dynamicPowerSharing,  $\text{MPR}_c = \text{MPR}'_c$  with  $\text{MPR}'_c$  determined in accordance with clause 6.2B.2.2 and  $A\text{-MPR}_c = 0$  dB if transmission(s) in subframe  $p$  on CG 1 overlap in time with physical channel  $q$  on CG 2;
- for a UE indicating support of dynamicPowerSharing,  $\text{MPR}_c$  is determined in accordance with TS 38.101-1 [2] if transmission(s) in subframe  $p$  on CG 1 does not overlap in time with physical channel  $q$  on CG 2;
- for a UE not indicating support of dynamicPowerSharing, the  $\text{MPR}_c$  is determined in accordance with clause 6.2B.2.2 with parameters applicable for UEs not indicating support of dynamicPowerSharing and  $A\text{-MPR}_c = 0$  dB;

whenever NS\_01 is indicated in CG 2.

For UEs indicating support of dynamicPowerSharing in the *UE-MRDC-Capability IE*, the UE can configure the total transmission power in accordance with clause 6.2B.4.1.1 but with  $P_{\text{powerclass,EN-DC}}$  the EN-DC power class of the intra-band non-contiguous band combination configured and  $A\text{-MPR}$  determined in accordance with clause 6.2B.3.2.

The total maximum output power  $P_{\text{UMAX}}$  over both CGs is measured in accordance with clause 6.2B.4.1.1 and shall be within the limits specified in clause 6.2B.4.1.1 but with parameters applicable for the non-contiguous band combination configured.

The maximum output power levels  $p_{\text{UMAX},c,\text{E-UTRA}}$  and  $p_{\text{UMAX},f,c,\text{NR}}$  for the CGs are measured in accordance with clause 6.2B.4.1.1 and shall be within the limits specified in clause 6.2B.4.1.1 but with parameters applicable for the non-contiguous band combination configured.

### 6.2B.4.1.3 Inter-band EN-DC within FR1

For inter-band dual connectivity with one uplink serving cell per CG on E-UTRA and NR respectively, the UE is allowed to set its configured maximum output power  $P_{\text{CMAX},c(i),i}$  for serving cell  $c(i)$  of CG  $i$ ,  $i = 1, 2$ , and its total configured maximum transmission power for EN-DC operation,  $P_{\text{Total}}^{\text{EN-DC}} = 10\log_{10}(\hat{P}_{\text{total}}^{\text{EN-DC}})$  with  $\hat{P}_{\text{total}}^{\text{EN-DC}}$  as specified in clause 7.6 of TS 38.213 [10].

The configured maximum output power  $P_{\text{CMAX\_E-UTRA},c}(p)$  in sub-frame  $p$  for the configured E-UTRA uplink carrier shall be set within the bounds:

$$P_{\text{CMAX\_L\_E-UTRA},c}(p) \leq P_{\text{CMAX\_E-UTRA},c}(p) \leq P_{\text{CMAX\_H\_E-UTRA},c}(p)$$

where  $P_{\text{CMAX\_L\_E-UTRA},c}$  and  $P_{\text{CMAX\_H\_E-UTRA},c}$  are the limits for a serving cell  $c$  as specified in TS 36.101 [4] clause 6.2.5 modified by  $P_{\text{LTE}}$  as follows:

$$P_{\text{CMAX\_L\_E-UTRA},c} = \text{MIN} \{ P_{\text{EMAX, EN-DC}}, (P_{\text{PowerClass, EN-DC}} - \Delta P_{\text{PowerClass, EN-DC}}), \text{MIN}(P_{\text{EMAX},c}, P_{\text{LTE}}) - \Delta t_{\text{c\_E-UTRA},c}, (P_{\text{PowerClass, E-UTRA}} - \Delta P_{\text{PowerClass, E-UTRA}}) - \text{MAX}(\text{MPR}_c + \text{A-MPR}_c + \Delta T_{\text{IB},c} + \Delta T_{\text{c\_E-UTRA},c} + \Delta T_{\text{ProSe}}, \text{P-MPR}_c) \}$$

$$P_{\text{CMAX\_H\_E-UTRA},c} = \text{MIN} \{ P_{\text{EMAX},c}, P_{\text{EMAX, EN-DC}}, (P_{\text{PowerClass, EN-DC}} - \Delta P_{\text{PowerClass, EN-DC}}), P_{\text{LTE}}, P_{\text{PowerClass, E-UTRA}} - \Delta P_{\text{PowerClass, E-UTRA}} \}$$

The configured maximum output power  $P_{\text{CMAX},f,c,\text{NR}}(q)$  in physical-channel  $q$  for the configured NR carrier shall be set within the bounds:

$$P_{\text{CMAX\_L},f,c,\text{NR}}(q) \leq P_{\text{CMAX},f,c,\text{NR}}(q) \leq P_{\text{CMAX\_H},f,c,\text{NR}}(q)$$

where  $P_{\text{CMAX\_L},f,c,\text{NR}}$  and  $P_{\text{CMAX\_H},f,c,\text{NR}}$  are the limits for a serving cell  $c$  as specified in clause 6.2.4 of TS 38.101-1 [2] modified as follows:

$$P_{\text{CMAX\_L},f,c,\text{NR}} = \text{MIN} \{ P_{\text{EMAX, EN-DC}}, (P_{\text{PowerClass, EN-DC}} - \Delta P_{\text{PowerClass, EN-DC}}), \text{MIN}(P_{\text{EMAX},c}, P_{\text{NR}}) - \Delta T_{\text{c\_NR},c}, (P_{\text{PowerClass, NR}} - \Delta P_{\text{PowerClass, NR}}) - \text{MAX}(\text{MAX}(\text{MPR}_c, \text{A-MPR}_c) + \Delta T_{\text{IB},c} + \Delta T_{\text{c\_NR},c} + \Delta T_{\text{RxsRS}}, \text{P-MPR}_c) \}$$

$$P_{\text{CMAX\_H},f,c,\text{NR}} = \text{MIN} \{ P_{\text{EMAX},c}, P_{\text{EMAX, EN-DC}}, (P_{\text{PowerClass, EN-DC}} - \Delta P_{\text{PowerClass, EN-DC}}), P_{\text{NR}}, P_{\text{PowerClass, NR}} - \Delta P_{\text{PowerClass, NR}} \}$$

where

- $P_{\text{EMAX, EN-DC}}$  is the value given by the field *p-maxUE-FR1* of the *RRCConnectionReconfiguration-v1530* IE as defined in TS 36.331 [8];
- $P_{\text{LTE}}$  is the value given by the field *p-maxEUTRA-r15* of the *RRCConnectionReconfiguration-v1510* IE as defined in TS 36.331 [8];
- $P_{\text{NR}}$  is the value given by the field *p-NR-FR1* of the *PhysicalCellGroupConfig* IE as defined TS 38.331 [9];
- $\Delta T_{\text{c\_E-UTRA},c} = 1.5$  dB when NOTE 2 in Table 6.2.2-1 in TS 36.101 [4] applies for a serving cell  $c$ , otherwise  $\Delta T_{\text{c\_E-UTRA},c} = 0$  dB;
- $\Delta T_{\text{c\_NR},c} = 1.5$  dB when NOTE 3 in Table 6.2.1-1 in TS 38.101-1 [2] applies for a serving cell  $c$ , otherwise  $\Delta T_{\text{c\_NR},c} = 0$  dB;
- $\Delta T_{\text{IB},c}$  specified in clause 6.2B.4.2.3 for EN-DC, the individual Power Class defined in table 6.2B.1.3 and any other additional power reductions parameters specified in clauses 6.2B.2 and 6.2B.3 for EN-DC are applicable to  $P_{\text{CMAX\_E-UTRA},c}$  and  $P_{\text{CMAX},f,c,\text{NR}}$  evaluations.
- $P_{\text{PowerClass, EN-DC}}$  is defined in clause 6.2B.1.3 for inter-band EN-DC;
- $P_{\text{PowerClass, NR}}$  is the nominal UE power of the power class that the UE supports for the NR band of the EN-DC combination as defined in clause 6.2.1 of 38.101-1 [2];
- $P_{\text{PowerClass, E-UTRA}}$  is the nominal UE power of the power class that the UE supports for the E-UTRA band of the EN-DC combination as defined in clause 6.2.2 of 36.101 [4];
- $\Delta P_{\text{PowerClass, EN-DC}} = 3$  dB for a power class 2 capable EN-DC UE when IE *p-maxUE-FR1*, as defined in TS 38.331 [9], is provided and set to the maximum output power of the default power class or lower; otherwise  $\Delta P_{\text{PowerClass, EN-DC}} = 0$  dB;

If the transmissions from NR and E-UTRA do not overlap, then the complete clauses for configured transmitted power for E-UTRA and NR respectively from their own specifications apply with the modifications specified above. The lower value between  $P_{\text{PowerClass, EN-DC}}$  or  $P_{\text{EMAX, EN-DC}}$  shall not be exceeded at any time by UE.

$P_{\text{Total}}^{\text{EN-DC}} = 10 \log_{10}(\hat{P}_{\text{total}}^{\text{EN-DC}})$  with  $P_{\text{Total}}^{\text{EN-DC}}$  the configured maximum transmission power for EN-DC operation as specified in clause 7.6 of TS 38.213 [10].

The total configured maximum transmission power for both synchronous and non-synchronous operation is

$$P_{Total}^{EN-DC} = \text{MIN} \{ P_{EMAX, EN-DC}, P_{PowerClass, EN-DC} - \Delta P_{PowerClass, EN-DC} \}$$

If the UE does not support dynamic power sharing,

$$P_{Total}^{EN-DC} = \text{MIN} \{ P_{EMAX, EN-DC}, P_{PowerClass, EN-DC} - \Delta P_{PowerClass, EN-DC} \} + 0.3 \text{ dB}$$

If the EN-DC UE does not support dynamic power sharing, then the complete clauses for configured transmitted power for E-UTRA and NR respectively from their own specifications TS 36.101 [4] and TS 38.101-1 [2] respectively apply with the modifications specified above and  $P_{Total}^{EN-DC}$  applies.

When a UE supporting dynamic sharing is configured for overlapping E-UTRA uplink and NR uplink transmissions, the UE can set its configured maximum output power  $P_{CMAX\_E-UTRA,c}$  and  $P_{CMAX,f,c,NR}$  for the configured E-UTRA and NR uplink carriers, respectively, and its configured maximum transmission power for EN-DC operation,  $\hat{P}_{Total}^{EN-DC}$ , as specified above.

The measured total maximum output power  $P_{UMAX}$  over both CGs/RATs, measured over the transmission reference time duration is

$$P_{UMAX} = 10 \log_{10} [p_{UMAX,c,E-UTRA} + p_{UMAX,c,NR}],$$

where  $p_{UMAX,c,E-UTRA}$  and  $p_{UMAX,c,NR}$  denotes the measured output power of serving cell  $c$  for E-UTRA and NR respectively, 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 an UL subframe transmission  $p$  from E-UTRA overlap with a physical-channel  $q$  from the NR, then for  $P_{UMAX}$  evaluation, the E-UTRA subframe  $p$  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 in aggregated carriers.  $P_{PowerClass, EN-DC}$  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 RAT carriers | E-UTRA 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:

$$P_{CMAX\_H} = \text{MAX} \{ P_{CMAX\_EN-DC\_H}(p,q), P_{CMAX\_EN-DC\_H}(p,q+I), \dots, P_{CMAX\_EN-DC\_H}(p,q+n) \}$$

where  $P_{CMAX\_EN-DC\_H}$  are the applicable upper limits for each overlapping scheduling unit pairs  $(p,q)$ ,  $(p,q+I)$ , up to  $(p,q+n)$  for each applicable  $T_{eval}$  duration, where  $q+n$  is the last NR UL physical-channel overlapping with E-UTRA subframe  $p$ .

While  $P_{CMAX\_L}$  is computed as follows:

$$P_{CMAX\_L} = \text{MIN} \{ P_{CMAX\_EN-DC\_L}(p,q), P_{CMAX\_EN-DC\_L}(p,q+I), \dots, P_{CMAX\_EN-DC\_L}(p,q+n) \}$$

where  $P_{CMAX\_EN-DC\_L}$  are the applicable lower limits for each overlapping scheduling unit pairs  $(p,q)$ ,  $(p,q+I)$ , up to  $(p,q+n)$  for each applicable  $T_{eval}$  duration, where  $q+n$  is the last NR UL physical-channel overlapping with E-UTRA subframe  $p$ ,

With

$$P_{CMAX\_EN-DC\_H}(p,q) = \text{MIN} \{ 10 \log_{10} [p_{CMAX\_H\_E-UTRA,c}(p) + p_{CMAX\_H,f,c,NR}(q)], P_{EMAX, EN-DC}, P_{PowerClass, EN-DC} \}$$

And:

$$a = 10 \log_{10} [p_{CMAX\_E-UTRA,c}(p) + p_{CMAX,f,c,NR}(q)] > P_{Total}^{EN-DC}$$

$$b = 10 \log_{10} [p_{\text{CMAX\_E-UTRA,c}}(p) + p_{\text{CMAX,f,c,NR}}(q) / X_{\text{scale}}] > P_{\text{Total}}^{\text{EN-DC}}$$

If a= FALSE

$$P_{\text{CMAX\_EN-DC\_L}}(p,q) = \text{MIN} \{ 10 \log_{10} [p_{\text{CMAX\_L\_E-UTRA,c}}(p) + p_{\text{CMAX\_L,f,c,NR}}(q)], P_{\text{EMAX, EN-DC}}, P_{\text{PowerClass, EN-DC}} \}$$

ELSE If (a=TRUE) AND (b=FALSE)

$$P_{\text{CMAX\_EN-DC\_L}}(p,q) = \text{MIN} \{ 10 \log_{10} [p_{\text{CMAX\_L\_E-UTRA,c}}(p) + p_{\text{CMAX\_L,f,c,NR}}(q) / X_{\text{scale}} ], P_{\text{EMAX, EN-DC}}, P_{\text{PowerClass, EN-DC}} \}$$

ELSE If b= TRUE

$$P_{\text{CMAX\_EN-DC\_L}}(p,q) = \text{MIN} \{ 10 \log_{10} [p_{\text{CMAX\_L\_E-UTRA,c}}(p) ], P_{\text{EMAX, EN-DC}}, P_{\text{PowerClass, EN-DC}} \}$$

where

- $p_{\text{CMAX\_H\_E-UTRA,c}}(p)$  is the E-UTRA higher limit of the maximum configured power expressed in linear scale;
- $p_{\text{CMAX\_H,f,c,NR}}(q)$  is the NR higher limit of the maximum configured power expressed in linear scale;
- $p_{\text{CMAX\_L\_E-UTRA,c}}(p)$  is the E-UTRA lower limit of the maximum configured power expressed in linear scale;
- $p_{\text{CMAX\_L,f,c,NR}}(q)$  is the NR lower limit of the maximum configured power expressed in linear scale;
- $P_{\text{PowerClass, EN-DC}}$  is defined in clause 6.2B.1.3-1 for inter-band EN-DC;
- $X_{\text{scale}}$  is the linear value of X dB which is configured by RRC and can only take values [0, 6]
- $p_{\text{CMAX\_E-UTRA,c}}(p)$  is the linear value of  $P_{\text{CMAX\_E-UTRA,c}}(p)$ , the real configured max power for E-UTRA
- $p_{\text{CMAX,f,c,NR}}(q)$  is the linear value of  $P_{\text{CMAX,f,c,NR}}(q)$ , the real configured max power of NR

**Table 6.2B.4.1.3-2:  $P_{\text{CMAX}}$  tolerance for Dual Connectivity E-UTRA-NR**

| $P_{\text{CMAX}}(\text{dBm})$  | Tolerance<br>$T_{\text{LOW}}(P_{\text{CMAX\_L}})$ (dB) | Tolerance<br>$T_{\text{HIGH}}(P_{\text{CMAX\_H}})$ (dB) |
|--|--|---|
| $23 \leq P_{\text{CMAX}} \leq 33$  | 3.0  | 2.0   |
| $22 \leq P_{\text{CMAX}} < 23$   | 5.0  | 2.0   |
| $21 \leq P_{\text{CMAX}} < 22$   | 5.0  | 3.0   |
| $20 \leq P_{\text{CMAX}} < 21$   | 6.0  | 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 not indicating support of dynamic power sharing, the upper tolerance $T_{\text{high}}$ shall be reduced by 0.3 dB for $P \geq 20$ dBm. |  |   |

When E-UTRA and NR transmissions overlap and the condition (If (a=TRUE) AND (b=FALSE)) is met, SCG shall be transmitted and the following supplementary minimum requirement apply for the measured SCG power,  $P_{\text{UMAX,f,c,NR}}(q)$ , under nominal conditions.

$$10 \log(p_{\text{CMAX\_L,f,c,NR}}(q) / X_{\text{scale}}) - T_{\text{LOW}}(10 \log(p_{\text{CMAX\_L,f,c,NR}}(q) / X_{\text{scale}})) \leq P_{\text{UMAX,f,c,NR}}(q) \leq 10 \log(p_{\text{CMAX\_H,f,c,NR}}(q)) + T_{\text{HIGH}}(10 \log(p_{\text{CMAX\_H,f,c,NR}}(q))).$$

with the tolerances  $T_{\text{LOW}}$  and  $T_{\text{HIGH}}$  for applicable values of  $P_{\text{CMAX}}$  specified in Table 6.2B.4.1.3-2.

### 6.2B.4.1.3a Inter-band NE-DC within FR1

For inter-band dual connectivity with one uplink serving cell per CG on E-UTRA and NR respectively, the UE is allowed to set its configured maximum output power  $P_{\text{CMAX,c}(i),i}$  for serving cell  $c(i)$  of CG  $i$ ,  $i = 1, 2$ , and its total configured maximum transmission power for NE-DC operation,  $P_{\text{Total}}^{\text{NE-DC}} = 10 \log_{10}(\hat{P}_{\text{total}}^{\text{NE-DC}})$  with  $\hat{P}_{\text{total}}^{\text{NE-DC}}$  as specified in clause 7.6.1A of TS 38.213 [10].

The configured maximum output power  $P_{\text{CMAX\_E-UTRA},c}(p)$  in sub-frame  $p$  for the configured E-UTRA uplink carrier shall be set within the bounds:

$$P_{\text{CMAX\_L\_E-UTRA},c}(p) \leq P_{\text{CMAX\_E-UTRA},c}(p) \leq P_{\text{CMAX\_H\_E-UTRA},c}(p)$$

where  $P_{\text{CMAX\_L\_E-UTRA},c}$  and  $P_{\text{CMAX\_H\_E-UTRA},c}$  are the limits for a serving cell  $c$  as specified in TS 36.101 [4] clause 6.2.5 modified by  $P_{\text{LTE}}$  as follows:

$$P_{\text{CMAX\_L\_E-UTRA},c} = \text{MIN} \{ P_{\text{EMAX, NE-DC}}, (P_{\text{PowerClass, NE-DC}} - \Delta P_{\text{PowerClass, NE-DC}}), \text{MIN}(P_{\text{EMAX},c}, P_{\text{LTE}}) - \Delta t_{\text{C\_E-UTRA},c}, (P_{\text{PowerClass, E-UTRA}} - \Delta P_{\text{PowerClass, E-UTRA}}) - \text{MAX}(M\text{PR}_c + A\text{-M}\text{PR}_c + \Delta T_{\text{IB},c} + \Delta T_{\text{C\_E-UTRA},c} + \Delta T_{\text{ProSe}}, P\text{-M}\text{PR}_c) \}$$

$$P_{\text{CMAX\_H\_E-UTRA},c} = \text{MIN} \{ P_{\text{EMAX},c}, P_{\text{EMAX, NE-DC}}, (P_{\text{PowerClass, NE-DC}} - \Delta P_{\text{PowerClass, NE-DC}}), P_{\text{LTE}}, P_{\text{PowerClass, E-UTRA}} - \Delta P_{\text{PowerClass, E-UTRA}} \}$$

with exception that

- if no symbol of slot  $i_1$  of the NR that is indicated as uplink or flexible by *TDD-UL-DL-ConfigurationCommon* or *TDD-UL-DL-ConfigDedicated* overlaps with subframe  $i_2$  of the E-UTRA; or
- if NR slot(s) that is indicated as downlink by *TDD-UL-DL-ConfigurationCommon* or *TDD-UL-DL-ConfigDedicated* does not overlap with subframe  $i_2$  of the E-UTRA; then

$$P_{\text{CMAX\_L\_E-UTRA},c} = \text{MIN} \{ P_{\text{EMAX, NE-DC}}, (P_{\text{PowerClass, NE-DC}} - \Delta P_{\text{PowerClass, NE-DC}}), P_{\text{EMAX},c} - \Delta t_{\text{C\_E-UTRA},c}, (P_{\text{PowerClass, E-UTRA}} - \Delta P_{\text{PowerClass, E-UTRA}}) - \text{MAX}(M\text{PR}_c + A\text{-M}\text{PR}_c + \Delta T_{\text{IB},c} + \Delta T_{\text{C\_E-UTRA},c} + \Delta T_{\text{ProSe}}, P\text{-M}\text{PR}_c) \}$$

$$P_{\text{CMAX\_H\_E-UTRA},c} = \text{MIN} \{ P_{\text{EMAX},c}, P_{\text{EMAX, NE-DC}}, (P_{\text{PowerClass, NE-DC}} - \Delta P_{\text{PowerClass, NE-DC}}), P_{\text{PowerClass, E-UTRA}} - \Delta P_{\text{PowerClass, E-UTRA}} \}$$

The configured maximum output power  $P_{\text{CMAX},f,c,\text{NR}}(q)$  in physical-channel  $q$  for the configured NR carrier shall be set within the bounds:

$$P_{\text{CMAX\_L},f,c,\text{NR}}(q) \leq P_{\text{CMAX},f,c,\text{NR}}(q) \leq P_{\text{CMAX\_H},f,c,\text{NR}}(q)$$

where  $P_{\text{CMAX\_L},f,c,\text{NR}}$  and  $P_{\text{CMAX\_H},f,c,\text{NR}}$  are the limits for a serving cell  $c$  as specified in clause 6.2.4 of TS 38.101-1 [2] modified by  $P_{\text{NR}}$  as follows:

$$P_{\text{CMAX\_L},f,c,\text{NR}} = \text{MIN} \{ P_{\text{EMAX, NE-DC}}, (P_{\text{PowerClass, NE-DC}} - \Delta P_{\text{PowerClass, NE-DC}}), \text{MIN}(P_{\text{EMAX},c}, P_{\text{NR}}) - \Delta T_{\text{C\_NR},c}, (P_{\text{PowerClass, NR}} - \Delta P_{\text{PowerClass, NR}}) - \text{MAX}(M\text{PR}_c + A\text{-M}\text{PR}_c + \Delta T_{\text{IB},c} + \Delta T_{\text{C\_NR},c} + \Delta T_{\text{RxSRS}}, P\text{-M}\text{PR}_c) \}$$

$$P_{\text{CMAX\_H},f,c,\text{NR}} = \text{MIN} \{ P_{\text{EMAX},c}, P_{\text{EMAX, NE-DC}}, (P_{\text{PowerClass, NE-DC}} - \Delta P_{\text{PowerClass, NE-DC}}), P_{\text{NR}}, P_{\text{PowerClass, NR}} - \Delta P_{\text{PowerClass, NR}} \}$$

- $P_{\text{EMAX, NE-DC}}$  signalled by RRC as *p-UE-FRI* in TS 38.331 [9];
- $P_{\text{LTE}}$  signalled by RRC as *p-MaxEUTRA* in TS 36.331 [8];
- $P_{\text{NR}}$  signalled by RRC as *p-NR-FRI* defined in TS 38.331 [9];

$-\Delta T_{\text{C\_E-UTRA},c} = 1.5\text{dB}$  when NOTE 2 in Table 6.2.2-1 in TS 36.101 [4] applies for a serving cell  $c$ , otherwise  $\Delta T_{\text{C\_E-UTRA},c} = 0\text{dB}$ ;

- $\Delta T_{\text{C\_NR},c} = 1.5\text{dB}$  when NOTE 3 in Table 6.2.1-1 in TS 38.101-1 [2] applies for a serving cell  $c$ , otherwise  $\Delta T_{\text{C\_NR},c} = 0\text{dB}$ ;
- $\Delta T_{\text{IB},c}$  specified in clause 6.2B.4.2.3 for NE-DC, the individual Power Class defined in table 6.2B.1.3a and any other additional power reductions parameters specified in clauses 6.2B.2.3a for NE-DC are applicable to  $P_{\text{CMAX\_E-UTRA},c}$  and  $P_{\text{CMAX},f,c,\text{NR}}$  evaluations.
- $P_{\text{PowerClass, NE-DC}}$  is defined in clause 6.2B.1.3a for inter-band NE-DC;
- $P_{\text{PowerClass, NR}}$  is the nominal UE power of the power class that the UE supports for the NR band of the NE-DC combination as defined in clause 6.2.1 of 38.101-1 [2];
- $P_{\text{PowerClass, E-UTRA}}$  is the nominal UE power of the power class that the UE supports for the E-UTRA band of the NE-DC combination as defined in clause 6.2.2 of 36.101 [4];

- $\Delta P_{\text{PowerClass,NE-DC}} = 3$  dB for a power class 2 capable NE-DC UE when the IE *p-UE-FRI* as defined in TS 38.331 [9] is provided and set to the maximum output power of the default power class or lower; otherwise  $\Delta P_{\text{PowerClass,NE-DC}} = 0$  dB;

If the transmissions from NR and E-UTRA do not overlap, then the complete clauses for configured transmitted power for E-UTRA and NR respectively from their own specifications apply with the modifications specified above. The lower value between  $P_{\text{PowerClass, NE-DC}}$  or  $P_{\text{EMAX, NE-DC}}$  shall not be exceeded at any time by UE.

$P_{\text{Total}}^{\text{NE-DC}} = 10 \log_{10}(\hat{P}_{\text{total}}^{\text{NE-DC}})$  with  $P_{\text{Total}}^{\text{NE-DC}}$  the configured maximum transmission power for NE-DC operation as specified in clause 7.6 of TS 38.213 [10].

The total configured maximum transmission power for both synchronous and non-synchronous operation is

$$P_{\text{Total}}^{\text{NE-DC}} = \text{MIN} \{ P_{\text{EMAX, NE-DC}}, P_{\text{PowerClass, NE-DC}} - \Delta P_{\text{PowerClass, NE-DC}} \}$$

If the UE does not support dynamic power sharing,

$$P_{\text{Total}}^{\text{NE-DC}} = \text{MIN} \{ P_{\text{EMAX, NE-DC}}, P_{\text{PowerClass, NE-DC}} - \Delta P_{\text{PowerClass, NE-DC}} \} + 0.3 \text{ dB}$$

If the NE-DC UE does not support dynamic power sharing, then the complete clauses for configured transmitted power for E-UTRA and NR respectively from their own specifications TS 36.101 [4] and TS 38.101-1 [2] respectively apply with the modifications specified above and  $P_{\text{Total}}^{\text{NE-DC}}$  applies.

When a UE supporting dynamic sharing is configured for overlapping E-UTRA uplink and NR uplink transmissions, the UE can set its configured maximum output power  $P_{\text{CMAX\_E-UTRA,c}}$  and  $P_{\text{CMAX\_f,c,NR}}$  for the configured E-UTRA and NR uplink carriers, respectively, and its configured maximum transmission power for NE-DC operation,  $\hat{P}_{\text{Total}}^{\text{NE-DC}}$ , as specified above.

The measured total maximum output power  $P_{\text{UMAX}}$  over both CGs/RATs, measured over the transmission reference time duration is

$$P_{\text{UMAX}} = 10 \log_{10} [p_{\text{UMAX,c,E-UTRA}} + p_{\text{UMAX,c,NR}}],$$

where  $p_{\text{UMAX,c,E-UTRA}}$  and  $p_{\text{UMAX,c,NR}}$  denotes the measured output power of serving cell *c* for E-UTRA and NR respectively, expressed in linear scale.

The measured total configured maximum output power  $P_{\text{UMAX}}$  shall be within the following bounds:

$$P_{\text{CMAX\_L}} - T_{\text{LOW}}(P_{\text{CMAX\_L}}) \leq P_{\text{UMAX}} \leq P_{\text{CMAX\_H}} + T_{\text{HIGH}}(P_{\text{CMAX\_H}})$$

with the tolerances  $T_{\text{LOW}}(P_{\text{CMAX\_L}})$  and  $T_{\text{HIGH}}(P_{\text{CMAX\_H}})$  for applicable values of  $P_{\text{CMAX}}$  specified in Table 6.2B.4.1.3a-2.

When an UL subframe transmission *p* from E-UTRA overlap with a physical-channel *q* from the NR, then for  $P_{\text{UMAX}}$  evaluation, the E-UTRA subframe *p* is taken as reference period  $T_{\text{REF}}$  and always considered as the reference measurement duration and the following rules are applicable.

$T_{\text{REF}}$  and  $T_{\text{eval}}$  are specified in Table 6.2B.4.1.3a-1 when same or different subframe and physical-channel durations are used in aggregated carriers.  $P_{\text{PowerClass,NE-DC}}$  shall not be exceeded by the UE during any evaluation period of time.

**Table 6.2B.4.1.3a-1:  $P_{\text{CMAX}}$  evaluation window**

| transmission duration                                     | $T_{\text{REF}}$ | $T_{\text{eval}}$  |
|---|------------------|--|
| Different transmission duration in different RAT carriers | LTE Subframe     | $\text{Min}(T_{\text{no\_hopping}}, \text{Physical Channel Length})$ |

For each  $T_{\text{REF}}$ , the  $P_{\text{CMAX\_H}}$  is evaluated per  $T_{\text{eval}}$  and given by the maximum value over the transmission(s) within the  $T_{\text{eval}}$  as follows:

$$P_{\text{CMAX\_H}} = \text{MAX} \{ P_{\text{CMAX\_NE-DC\_H}}(p,q), P_{\text{CMAX\_NE-DC\_H}}(p,q+1), \dots, P_{\text{CMAX\_NE-DC\_H}}(p,q+n) \}$$

where  $P_{\text{CMAX\_NE-DC\_H}}$  are the applicable upper limits for each overlapping scheduling unit pairs  $(p,q)$ ,  $(p,q+1)$ , up to  $(p,q+n)$  for each applicable  $T_{\text{eval}}$  duration, where  $q+n$  is the last NR UL physical-channel overlapping with LTE subframe *p*.

While  $P_{\text{CMAX\_L}}$  is computed as follows:



$$P_{\text{CMAX\_L}} = \text{MIN} \{ P_{\text{CMAX\_NE-DC\_L}}(p,q), P_{\text{CMAX\_NE-DC\_L}}(p,q+1), \dots, P_{\text{CMAX\_NE-DC\_L}}(p,q+n) \}$$

where  $P_{\text{CMAX\_NE-DC\_L}}$  are the applicable lower limits for each overlapping scheduling unit pairs  $(p,q)$ ,  $(p, q+1)$ , up to  $(p, q+n)$  for each applicable  $T_{\text{eval}}$  duration, where  $q+n$  is the last NR UL physical-channel overlapping with LTE subframe  $p$ ,

With

$$P_{\text{CMAX\_NE-DC\_H}}(p,q) = \text{MIN} \{ 10 \log_{10} [p_{\text{CMAX\_H\_E-UTRA,c}}(p) + p_{\text{CMAX\_H,f,c,NR}}(q)], P_{\text{EMAX, NE-DC}}, P_{\text{PowerClass, NE-DC}} \}$$

And:

$$a = 10 \log_{10} [p_{\text{CMAX\_E-UTRA,c}}(p) + p_{\text{CMAX,f,c,NR}}(q)] > P_{\text{Total}}^{\text{NE-DC}}$$

If  $a = \text{TRUE}$

$$P_{\text{CMAX\_NE-DC\_L}}(p,q) = \text{MIN} \{ 10 \log_{10} [p_{\text{CMAX\_L\_E-UTRA,c}}(p)], P_{\text{EMAX, NE-DC}}, P_{\text{PowerClass, NE-DC}} \}$$

Else

$$P_{\text{CMAX\_NE-DC\_L}}(p,q) = \text{MIN} \{ 10 \log_{10} [p_{\text{CMAX\_L\_E-UTRA,c}}(p) + p_{\text{CMAX\_L,f,c,NR}}(q)], P_{\text{EMAX, NE-DC}}, P_{\text{PowerClass, NE-DC}} \}$$

where

- $p_{\text{CMAX\_H\_E-UTRA,c}}(p)$  is the E-UTRA higher limit of the maximum configured power expressed in linear scale;
- $p_{\text{CMAX\_H,f,c,NR}}(q)$  is the NR higher limit of the maximum configured power expressed in linear scale;
- $p_{\text{CMAX\_L\_E-UTRA,c}}(p)$  is the E-UTRA lower limit of the maximum configured power expressed in linear scale;
- $p_{\text{CMAX\_L,f,c,NR}}(q)$  is the NR lower limit of the maximum configured power expressed in linear scale;
- $P_{\text{PowerClass, NE-DC}}$  is defined in clause 6.2B.1.3a for inter-band NE-DC;
- $p_{\text{CMAX\_E-UTRA,c}}(p)$  is the linear value of  $P_{\text{CMAX\_E-UTRA,c}}(p)$ , the real configured max power for E-UTRA
- $p_{\text{CMAX,f,c,NR}}(q)$  is the linear value of  $P_{\text{CMAX,f,c,NR}}(q)$ , the real configured max power of NR

**Table 6.2B.4.1.3a-2:  $P_{\text{CMAX}}$  tolerance for Dual Connectivity E-UTRA-NR**

| $P_{\text{CMAX}}(\text{dBm})$  | Tolerance<br>$T_{\text{LOW}}(P_{\text{CMAX\_L}})$ (dB) | Tolerance<br>$T_{\text{HIGH}}(P_{\text{CMAX\_H}})$ (dB) |
|--|--|---|
| $23 \leq P_{\text{CMAX}} \leq 33$  | 3.0  | 2.0   |
| $22 \leq P_{\text{CMAX}} < 23$   | 5.0  | 2.0   |
| $21 \leq P_{\text{CMAX}} < 22$   | 5.0  | 3.0   |
| $20 \leq P_{\text{CMAX}} < 21$   | 6.0  | 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 not indicating support of dynamic power sharing, the upper tolerance $T_{\text{high}}$ shall be reduced by 0.3 dB for $P \geq 20$ dBm. |  |   |

When E-UTRA and NR transmissions overlap and the condition  $a = \text{TRUE}$ ,  $P_{\text{UMAX,f,c,NR}}(q)$  for MCG, under nominal conditions, shall meet

$$P_{\text{UMAX,f,c,NR}}(q) \leq 10 \log(p_{\text{CMAX\_H,f,c,NR}}(q)) + T_{\text{HIGH}}(10 \log(p_{\text{CMAX\_H,f,c,NR}}(q))).$$

with the tolerances  $T_{\text{LOW}}$  and  $T_{\text{HIGH}}$  for applicable values of  $P_{\text{CMAX}}$  specified in Table 6.2B.4a.1.3-2.

When LTE and NR transmissions overlap and the condition  $a = \text{FALSE}$ , then  $P_{\text{UMAX}}$ , under nominal conditions, shall be within the following bounds:

$$P_{\text{CMAX\_L}} - T_{\text{LOW}}(P_{\text{CMAX\_L}}) \leq P_{\text{UMAX}} \leq P_{\text{CMAX\_H}} + T_{\text{HIGH}}(P_{\text{CMAX\_H}})$$

where  $P_{\text{CMAX\_L}}$ ,  $P_{\text{CMAX\_H}}$ , and  $P_{\text{UMAX}}$  are specified above with the tolerances  $T_{\text{LOW}}$  and  $T_{\text{HIGH}}$  specified in Table 6.2B.4a.1.3-2 for applicable values of  $P_{\text{CMAX\_L}}$  and  $P_{\text{CMAX\_H}}$ .

#### 6.2B.4.1.4 Inter-band EN-DC including FR2

For inter-band dual connectivity with one uplink serving cell per CG on E-UTRA and NR respectively, with NR configured in FR2, the UE is allowed to set its configured maximum output power  $P_{\text{CMAX},c(i),i}$  for serving cell  $c(i)$  of CG  $i$ ,  $i = 1,2$ .

The UE maximum configured power  $P_{\text{CMAX},c(i)}$ , on E-UTRA for the subframe  $i$  shall be set according to clause 6.2.5 from TS 36.101 [4]. Applicable inter-band  $\Delta T_{\text{IB},c}$  parameters shall be used according to the clauses 6.2B.4.2.4 or 6.2B.4.2.5.

The UE maximum configured power  $P_{\text{CMAX},c(j)}$ , on NR for the slot  $j$  shall be set according to subclass 6.2.4 from TS 38.101-2 [3].

For the configured power measurements TS 36.101 [4] clause 6.2.5 and TS 38.101-2 [3] clause 6.2.4 are applicable.

#### 6.2B.4.1.5 Inter-band EN-DC including both FR1 and FR2

For inter-band dual connectivity with one uplink serving cell per CG on E-UTRA and NR respectively, with both CGs configured in FR1, the requirements specified in clause 6.2B.4.1.3 apply.

For inter-band dual connectivity with one uplink serving cell per CG on E-UTRA and NR respectively, with NR configured in FR2, the requirements specified in clause 6.2B.4.1.4 apply.

For inter-band dual connectivity with one uplink serving cell in first CG on E-UTRA and two uplink serving cells in second CG on NR FR1 and NR FR2 respectively, the UE is allowed to set its configured maximum output power  $P_{\text{CMAX},c(i),i}$  for serving cell  $c(i)$ ,  $i = 1,2,3$  with  $i=1$  for E-UTRA,  $i=2$  for NR FR1 and  $i=3$  for NR FR2.

- For serving cell on FR2, the requirements specified in clause 6.2.4 in TS 38.101-2 [3] apply to the UE maximum configured power  $P_{\text{CMAX},c(3),3}$  and the measured maximum configured power.
- For remaining inter-band dual connectivity involving CG1 and CG2, the requirements specified in clause 6.2B.4.1.3 apply.

### 6.2B.4.2 $\Delta T_{\text{IB},c}$ for DC

#### 6.2B.4.2.0 General

For the UE which supports inter-band EN-DC or NE-DC configuration,  $\Delta T_{\text{IB},c}$  in Tables below applies where unless otherwise stated, the same  $\Delta T_{\text{IB},c}$  is applicable to NR band(s) part for DC configurations which have the same NR operating band combination. Unless otherwise stated,  $\Delta T_{\text{IB},c}$  is set to zero.

Unless  $\Delta T_{\text{IB},c}$  is specified for the NE-DC configuration, the specified  $\Delta T_{\text{IB},c}$  for the EN-DC configuration including same bands as the corresponding NE-DC configuration is applicable for the NE-DC configuration.

#### 6.2B.4.2.1 Intra-band contiguous EN-DC

$\Delta T_{\text{IB},c}$  is not applicable for intra-band contiguous EN-DC.

#### 6.2B.4.2.2 Intra-band non-contiguous EN-DC

$\Delta T_{\text{IB},c}$  is not applicable for intra-band non-contiguous EN-DC.

## 6.2B.4.2.3 Inter-band EN-DC within FR1

6.2B.4.2.3.1  $\Delta T_{IB,c}$  for EN-DC two bandsTable 6.2B.4.2.3.1-1:  $\Delta T_{IB,c}$  due to EN-DC(two bands)

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta T_{IB,c}$ (dB) |
|--------------------------------|-------------------|------------------------|
| DC_1_n28                       | 1                 | 0.3                    |
|                                | n28               | 0.6                    |
| DC_1_n40                       | 1                 | 0.5                    |
|                                | n40               | 0.5                    |
| DC_1_n51                       | 1                 | 0.6                    |
|                                | n51               | 0.6                    |
| DC_1_n77                       | 1                 | 0.6                    |
|                                | n77               | 0.8                    |
| DC_1_n78                       | 1                 | 0.3                    |
|                                | n78               | 0.8                    |
| DC_2_n5                        | 2                 | 0.3                    |
|                                | n5                | 0.3                    |
| DC_2_n66                       | 2                 | 0.5                    |
|                                | n66               | 0.5                    |
| DC_2_n71                       | 2                 | 0.3                    |
|                                | n71               | 0.3                    |
| DC_2_n78                       | 2                 | 0.6                    |
|                                | n78               | 0.8                    |
| DC_3_n7                        | 3                 | 0.5                    |
|                                | n7                | 0.5                    |
| DC_3_n28                       | 3                 | 0.3                    |
|                                | n28               | 0.3                    |
| DC_3_n40                       | 3                 | 0.5                    |
|                                | n40               | 0.5                    |
| DC_3_n51                       | 3                 | 0.3                    |
|                                | n51               | 0.3                    |
| DC_3_n77                       | 3                 | 0.6                    |
|                                | n77               | 0.8                    |
| DC_3_n78                       | 3                 | 0.6                    |
|                                | n78               | 0.8                    |
| DC_5_n40                       | 5                 | 0.3                    |
|                                | n40               | 0.3                    |
| DC_5_n66                       | 5                 | 0.3                    |
|                                | n66               | 0.3                    |
| DC_5_n78                       | 5                 | 0.6                    |
|                                | n78               | 0.8                    |
| DC_7_n28                       | 7                 | 0.3                    |
|                                | n28               | 0.3                    |
| DC_7_n51                       | 7                 | 0.3                    |
|                                | n51               | 0.3                    |
| DC_7_n78<br>DC_7-7_n78         | 7                 | 0.5                    |
|                                | n78               | 0.8                    |
| DC_8_n40                       | 8                 | 0.3                    |
|                                | n40               | 0.3                    |
| DC_8_n77                       | 8                 | 0.6                    |
|                                | n77               | 0.8                    |
| DC_8_n78                       | 8                 | 0.6                    |
|                                | n78               | 0.8                    |
| DC_11_n77                      | 11                | 0.4                    |
|                                | n77               | 0.8                    |
| DC_11_n78                      | 11                | 0.4                    |
|                                | n78               | 0.8                    |
| DC_12_n5                       | 12                | 0.4                    |
|                                | n5                | 0.8                    |
| DC_12_n66                      | 12                | 0.8                    |
|                                | n66               | 0.3                    |
| DC_18_n77                      | 18                | 0.3                    |

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta T_{B,c}$ (dB)                |
|--------------------------------|-------------------|--------------------------------------|
|                                | n77               | 0.8                                  |
| DC_18_n78                      | 18                | 0.3                                  |
|                                | n78               | 0.8                                  |
| DC_19_n77                      | 19                | 0.3                                  |
|                                | n77               | 0.8                                  |
| DC_19_n78                      | 19                | 0.3                                  |
|                                | n78               | 0.8                                  |
| DC_20_n8                       | 20                | 0.4                                  |
|                                | n8                | 0.4                                  |
| DC_20_n28                      | 20                | 0.5                                  |
|                                | n28               | 0.5                                  |
| DC_20_n51                      | 20                | 0.5                                  |
|                                | n51               | 0.5                                  |
| DC_20_n77                      | 20                | 0.6                                  |
|                                | n77               | 0.8                                  |
| DC_20_n78                      | 20                | 0.6                                  |
|                                | n78               | 0.8                                  |
| DC_21_n77                      | 21                | 0.4                                  |
|                                | n77               | 0.8                                  |
| DC_21_n78                      | 21                | 0.4                                  |
|                                | n78               | 0.8                                  |
| DC_25_n41                      | 25                | 0.5                                  |
|                                | n41               | 0.4 <sup>1</sup><br>0.9 <sup>2</sup> |
| DC_26_n41                      | 26                | 0.3                                  |
|                                | n41               | 0.3                                  |
| DC_26_n77                      | 26                | 0.3                                  |
|                                | n77               | 0.8                                  |
| DC_26_n78                      | 26                | 0.3                                  |
|                                | n78               | 0.8                                  |
| DC_28_n51                      | 28                | 0.5                                  |
|                                | n51               | 0.5                                  |
| DC_28_n77                      | 28                | 0.5                                  |
|                                | n77               | 0.8                                  |
| DC_28_n78                      | 28                | 0.5                                  |
|                                | n78               | 0.8                                  |
| DC_30_n5                       | 30                | 0.3                                  |
|                                | n5                | 0.3                                  |
| DC_30_n66                      | 30                | 0.5                                  |
|                                | n66               | 0.8                                  |
| DC_38_n78                      | n78               | 0.5                                  |
| DC_39_n78                      | 39                | 0.3                                  |
|                                | n78               | 0.8                                  |
| DC_39_n79                      | 39                | 0.3                                  |
|                                | n79               | 0.8                                  |
| DC_40_n77                      | n77               | 0.5                                  |
| DC_41_n77                      | 41                | 0.3                                  |
|                                | n77               | 0.8                                  |
| DC_41_n78                      | 41                | 0.3                                  |
|                                | n78               | 0.8                                  |
| DC_41_n79                      | 41                | 0.3                                  |
|                                | n79               | 0.8                                  |
| DC_42_n51                      | 42                | 0.6                                  |
|                                | n51               | 0.8                                  |
| DC_66_n5                       | 66                | 0.3                                  |
|                                | n5                | 0.3                                  |
| DC_66_n71                      | 66                | 0.3                                  |
|                                | n71               | 0.3                                  |
| DC_66_n78                      | 66                | 0.6                                  |
|                                | n78               | 0.8                                  |

NOTE 1: The requirement is applied for UE transmitting on the frequency range of 2545-2690 MHz.

NOTE 2: The requirement is applied for UE transmitting on the frequency range of 2496-2545 MHz.

## 6.2B.4.2.3.2

 $\Delta T_{IB,c}$  for EN-DC three bandsTable 6.2B.4.2.3.2-1:  $\Delta T_{IB,c}$  due to EN-DC (three bands)

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta T_{IB,c}$ (dB) |
|--------------------------------|-------------------|------------------------|
| DC_1-3_n28                     | 1                 | 0.3                    |
|                                | 3                 | 0.3                    |
|                                | n28               | 0.6                    |
| DC_1-3_n77                     | 1                 | 0.6                    |
|                                | 3                 | 0.6                    |
|                                | n77               | 0.8                    |
| DC_1-3_n78                     | 1                 | 0.6                    |
|                                | 3                 | 0.6                    |
|                                | n78               | 0.8                    |
| DC_1-3_n79                     | 1                 | 0.3                    |
|                                | 3                 | 0.3                    |
| DC_1-5_n78                     | 1                 | 0.3                    |
|                                | 5                 | 0.6                    |
|                                | n78               | 0.8                    |
| DC_1-7_n28                     | 1                 | 0.5                    |
|                                | 7                 | 0.6                    |
|                                | n28               | 0.6                    |
| DC_1-7_n78<br>DC_1-7-7_n78     | 1                 | 0.6                    |
|                                | 7                 | 0.6                    |
|                                | n78               | 0.8                    |
| DC_1-8_n78                     | 1                 | 0.3                    |
|                                | 8                 | 0.6                    |
|                                | n78               | 0.8                    |
| DC_1-18_n77                    | 1                 | 0.3                    |
|                                | 18                | 0.3                    |
|                                | n77               | 0.8                    |
| DC_1-18_n78                    | 1                 | 0.3                    |
|                                | 18                | 0.3                    |
|                                | n78               | 0.8                    |
| DC_1-19_n77                    | 1                 | 0.3                    |
|                                | 19                | 0.3                    |
|                                | n77               | 0.8                    |
| DC_1-19_n78                    | 1                 | 0.3                    |
|                                | 19                | 0.3                    |
|                                | n78               | 0.8                    |
| DC_1-19_n79                    | 1                 | 0.3                    |
|                                | 19                | 0.3                    |
| DC_1-20_n28                    | 1                 | 0.3                    |
|                                | 20                | 0.6                    |
|                                | n28               | 0.6                    |
| DC_1-20_n78                    | 1                 | 0.3                    |
|                                | 20                | 0.3                    |
|                                | n78               | 0.8                    |
| DC_1-21_n77                    | 1                 | 0.3                    |
|                                | 21                | 0.3                    |
|                                | n77               | 0.8                    |
| DC_1-21_n78                    | 1                 | 0.6                    |
|                                | 21                | 0.4                    |
|                                | n78               | 0.8                    |
| DC_1-21_n79                    | 1                 | 0.3                    |
|                                | 21                | 0.3                    |
| DC_1-28_n77                    | 1                 | 0.3                    |
|                                | 28                | 0.6                    |
|                                | n77               | 0.8                    |
| DC_1-28_n78<br>DC_1_n28-n78    | 1                 | 0.3                    |
|                                | 28 or n28         | 0.6                    |
|                                | n78               | 0.8                    |
| DC_1_n28-n79                   | 1                 | 0.3                    |
|                                | n28               | 0.3                    |

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta T_{IB,c}$ (dB) |
|--------------------------------|-------------------|------------------------|
| DC_1-41_n77                    | 1                 | 0.5                    |
|                                | 41                | 0.5                    |
|                                | n77               | 0.8                    |
| DC_1-41_n78                    | 1                 | 0.5                    |
|                                | 41                | 0.5                    |
|                                | n78               | 0.8                    |
| DC_1-41_n79                    | 1                 | 0.5                    |
|                                | 41                | 0.5                    |
| DC_1-42_n77                    | 1                 | 0.6                    |
|                                | 42                | 0.8                    |
|                                | n77               | 0.8                    |
| DC_1-42_n78                    | 1                 | 0.3                    |
|                                | 42                | 0.8                    |
|                                | n78               | 0.8                    |
| DC_1-42_n79                    | 1                 | 0.3                    |
|                                | 42                | 0.8                    |
| DC_1_n77-n79                   | 1                 | 0.6                    |
|                                | n77               | 0.8                    |
| DC_1_SUL_n78-n84               | 1                 | 0.3                    |
|                                | n78               | 0.8                    |
|                                | n84               | 0.3                    |
| DC_1_n78-n79                   | 1                 | 0.3                    |
|                                | n78               | 0.8                    |
|                                | n79               | 0.5                    |
| DC_2-5_n66                     | 2                 | 0.5                    |
|                                | 5                 | 0.3                    |
|                                | n66               | 0.5                    |
| DC_2-30_n66                    | 2                 | 0.5                    |
|                                | 30                | 0.3                    |
|                                | n66               | 0.5                    |
| DC_2-66_n71                    | 2                 | 0.5                    |
|                                | 66                | 0.5                    |
|                                | n71               | 0.3                    |
| DC_2-(n)71                     | 2                 | 0.3                    |
|                                | 71                | 0.3                    |
| DC_3_n3-n77                    | 3                 | 0.6                    |
|                                | n3                | 0.6                    |
|                                | n77               | 0.8                    |
| DC_3_n3-n78                    | 3                 | 0.6                    |
|                                | n3                | 0.6                    |
|                                | n78               | 0.8                    |
| DC_3-5_n78                     | 3                 | 0.6                    |
|                                | 5                 | 0.6                    |
|                                | n78               | 0.8                    |
| DC_3-7_n28                     | 3                 | 0.5                    |
|                                | 7                 | 0.5                    |
|                                | n28               | 0.3                    |
| DC_3-7_n78, DC_3-7-7_n78       | 3                 | 0.6                    |
|                                | 7                 | 0.6                    |
|                                | n78               | 0.8                    |
| DC_3-8_n78                     | 3                 | 0.6                    |
|                                | 8                 | 0.6                    |
|                                | n78               | 0.8                    |
| DC_3-19_n77                    | 3                 | 0.6                    |
|                                | 19                | 0.3                    |
|                                | n77               | 0.8                    |
| DC_3-19_n78                    | 3                 | 0.6                    |
|                                | 19                | 0.3                    |
|                                | n78               | 0.8                    |
| DC_3-19_n79                    | 3                 | 0.3                    |
|                                | 19                | 0.3                    |
| DC_3-20_n28                    | 3                 | 0.3                    |

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta T_{IB,c}$ (dB) |
|--------------------------------|-------------------|------------------------|
|                                | 20                | 0.5                    |
|                                | n28               | 0.5                    |
| DC_3-20_n78                    | 3                 | 0.5                    |
|                                | 20                | 0.3                    |
|                                | n78               | 0.8                    |
| DC_3-21_n77                    | 3                 | 0.8                    |
|                                | 21                | 0.9                    |
|                                | n77               | 0.8                    |
| DC_3-21_n78                    | 3                 | 0.8                    |
|                                | 21                | 0.9                    |
|                                | n78               | 0.8                    |
| DC_3-21_n79                    | 3                 | 0.8                    |
|                                | 21                | 0.9                    |
| DC_3-28_n78                    | 3                 | 0.5                    |
|                                | 28                | 0.3                    |
|                                | n78               | 0.8                    |
| DC_3_n28-n78                   | 3                 | 0.5                    |
|                                | n28               | 0.3                    |
|                                | n78               | 0.8                    |
| DC_3-38_n78                    | 3                 | 0.6                    |
|                                | n78               | 0.8                    |
| DC_3-41_n78                    | 3                 | 0.6                    |
|                                | 41                | 0.3 <sup>1</sup>       |
|                                | n78               | 0.8 <sup>2</sup>       |
| DC_3-42_n77                    | 3                 | 0.6                    |
|                                | 42                | 0.8                    |
|                                | n77               | 0.8                    |
| DC_3-42_n78                    | 3                 | 0.6                    |
|                                | 42                | 0.8                    |
|                                | n78               | 0.8                    |
| DC_3-42_n79                    | 3                 | 0.6                    |
|                                | 42                | 0.8                    |
| DC_3_n77-n79                   | 3                 | 0.6                    |
|                                | n77               | 0.8                    |
| DC_3_n78-n79                   | 3                 | 0.6                    |
|                                | n78               | 0.8                    |
|                                | n79               | 0.5                    |
| DC_3_SUL_n78-n80               | 3                 | 0.6                    |
|                                | n78               | 0.8                    |
|                                | n80               | 0.6                    |
| DC_3_SUL_n78-n82               | 3                 | 0.5                    |
|                                | n78               | 0.8                    |
|                                | n82               | 0.3                    |
| DC_5-7_n78, DC_5-7-7_n78       | 5                 | 0.6                    |
|                                | 7                 | 0.6                    |
|                                | n78               | 0.8                    |
| DC_5-30_n66                    | 5                 | 0.3                    |
|                                | 30                | 0.3                    |
|                                | n66               | 0.5                    |
| DC_7-20_n28                    | 7                 | 0.3                    |
|                                | 20                | 0.6                    |
|                                | n28               | 0.6                    |
| DC_7-20_n78                    | 7                 | 0.3                    |
|                                | 20                | 0.3                    |
|                                | n78               | 0.8                    |
| DC_7-28_n78                    | 7                 | 0.3                    |
|                                | 28                | 0.3                    |
|                                | n78               | 0.8                    |
| DC_7_n28-n78                   | 7                 | 0.3                    |
|                                | n28               | 0.3                    |
|                                | n78               | 0.8                    |
| DC_7-46_n78                    | 7                 | 0.5                    |

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta T_{IB,c}$ (dB) |
|--------------------------------|-------------------|------------------------|
|                                | n78               | 0.8                    |
| DC_8_SUL_n78- n81              | 8                 | 0.6                    |
|                                | n78               | 0.8                    |
|                                | n81               | 0.6                    |
| DC_18-28_n77                   | 18                | 0.5                    |
|                                | 28                | 0.5                    |
|                                | n77               | 0.8                    |
| DC_18-28_n78                   | 18                | 0.5                    |
|                                | 28                | 0.5                    |
|                                | n78               | 0.8                    |
| DC_18-28_n79                   | 18                | 0.5                    |
|                                | 28                | 0.5                    |
|                                | n78               | 0.8                    |
| DC_19-21_n77                   | 19                | 0.3                    |
|                                | 21                | 0.4                    |
|                                | n77               | 0.8                    |
| DC_19-21_n78                   | 19                | 0.3                    |
|                                | 21                | 0.4                    |
|                                | n78               | 0.8                    |
| DC_19-21_n79                   | 19                | 0.3                    |
|                                | 21                | 0.4                    |
|                                | n78               | 0.8                    |
| DC_19-42_n77                   | 19                | 0.3                    |
|                                | 42                | 0.8                    |
|                                | n77               | 0.8                    |
| DC_19-42_n78                   | 19                | 0.3                    |
|                                | 42                | 0.8                    |
|                                | n78               | 0.8                    |
| DC_19-42_n79                   | 19                | 0.3                    |
|                                | 42                | 0.8                    |
|                                | n78               | 0.8                    |
| DC_19_n77-n79                  | 19                | 0.3                    |
|                                | n77               | 0.8                    |
|                                | n79               | 0.5                    |
| DC_20_n8-n75                   | 20                | 0.4                    |
|                                | n8                | 0.4                    |
|                                | n75               | 0.4                    |
| DC_20_n28-n75                  | 20                | 0.5                    |
|                                | n28               | 0.7                    |
|                                | n75               | 0.7                    |
| DC_20_n28-n78                  | 20                | 0.6                    |
|                                | n28               | 0.6                    |
|                                | n78               | 0.8                    |
| DC_20_n75-n78                  | 20                | 0.5                    |
|                                | n75               | 0.8                    |
|                                | n78               | 0.8                    |
| DC_20_n76-n78                  | 20                | 0.5                    |
|                                | n76               | 0.8                    |
|                                | n78               | 0.8                    |
| DC_20_SUL_n78-n82              | 20                | 0.6                    |
|                                | n78               | 0.8                    |
|                                | n82               | 0.6                    |
| DC_20_SUL_n78-n83              | 20                | 0.8                    |
|                                | n78               | 0.8                    |
|                                | n83               | 0.8                    |
| DC_21-42_n77                   | 21                | 0.4                    |
|                                | 42                | 0.8                    |
|                                | n77               | 0.8                    |
| DC_21-42_n78                   | 21                | 0.4                    |
|                                | 42                | 0.8                    |
|                                | n78               | 0.8                    |
| DC_21-42_n79                   | 21                | 0.4                    |
|                                | 42                | 0.8                    |
|                                | n79               | 0.8                    |
| DC_21_n77-n79                  | 21                | 0.4                    |
|                                | n77               | 0.8                    |
|                                | n79               | 0.8                    |
| DC_21_n78-n79                  | 21                | 0.4                    |
|                                | n78               | 0.8                    |
|                                | n79               | 0.5                    |



| Inter-band EN-DC configuration  | E-UTRA or NR Band | $\Delta T_{IB,c}$ (dB) |
|---|-------------------|------------------------|
| DC_28-42_n77  | 28                | 0.5                    |
|   | 42                | 0.8                    |
|   | n77               | 0.8                    |
| DC_28-42_n78  | 28                | 0.5                    |
|   | 42                | 0.8                    |
|   | n78               | 0.8                    |
| DC_28-42_n79  | 28                | 0.5                    |
|   | 42                | 0.8                    |
| DC_28_SUL_n78-n83   | 28                | 0.5                    |
|   | n78               | 0.8                    |
|   | n83               | 0.5                    |
| DC_41-42_n77  | 41                | 0.5                    |
|   | 42                | 0.8                    |
|   | n77               | 0.8                    |
| DC_41-42_n78  | 41                | 0.5                    |
|   | 42                | 0.8                    |
|   | n78               | 0.8                    |
| DC_41-42_n79  | 41                | 0.3                    |
|   | 42                | 0.8                    |
| DC_66_(n)71   | 66                | 0.3                    |
|   | 71                | 0.3                    |
|   | n71               | 0.3                    |
| DC_66_SUL_n78-n86   | 66                | 0.6                    |
|   | n78               | 0.8                    |
|   | n86               | 0.6                    |
| NOTE 1: The requirement is applied for UE transmitting on the frequency range of 2545-2690 MHz. |                   |                        |
| NOTE 2: The requirement is applied for UE transmitting on the frequency range of 2496-2545 MHz. |                   |                        |

## 6.2B.4.2.3.3

 $\Delta T_{IB,c}$  for EN-DC four bandsTable 6.2B.4.2.3.3-1:  $\Delta T_{IB,c}$  due to EN-DC(four bands)

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta T_{IB,c}$ (dB) |
|--------------------------------|-------------------|------------------------|
| DC_1-3-5_n78                   | 1                 | 0.6                    |
|                                | 3                 | 0.6                    |
|                                | 5                 | 0.3                    |
|                                | n78               | 0.8                    |
| DC_1-3-7_n28                   | 1                 | 0.6                    |
|                                | 3                 | 0.6                    |
|                                | 7                 | 0.6                    |
|                                | n28               | 0.6                    |
| DC_1-3-7_n78<br>DC_1-3-7-7_n78 | 1                 | 0.7                    |
|                                | 3                 | 0.7                    |
|                                | 7                 | 0.7                    |
|                                | n78               | 0.8                    |
| DC_1-3-8_n78                   | 1                 | 0.6                    |
|                                | 3                 | 0.6                    |
|                                | 8                 | 0.6                    |
|                                | n78               | 0.8                    |
| DC_1-3-19_n78                  | 1                 | 0.6                    |
|                                | 3                 | 0.6                    |
|                                | 19                | 0.3                    |
|                                | n78               | 0.8                    |
| DC_1-3-19_n79                  | 1                 | 0.3                    |
|                                | 3                 | 0.3                    |
|                                | 19                | 0.3                    |
| DC_1-3-20_n28                  | 1                 | 0.3                    |
|                                | 3                 | 0.3                    |
|                                | 20                | 0.6                    |

| Inter-band EN-DC configuration  | E-UTRA or NR Band | $\Delta T_{IB,c}$ (dB) |
|---------------------------------|-------------------|------------------------|
|                                 | n28               | 0.6                    |
| DC_1-3-20_n78                   | 1                 | 0.6                    |
|                                 | 3                 | 0.6                    |
|                                 | 20                | 0.3                    |
|                                 | n78               | 0.8                    |
| DC_1-3-21_n77                   | 1                 | 0.6                    |
|                                 | 3                 | 0.8                    |
|                                 | 21                | 0.9                    |
|                                 | n77               | 0.8                    |
| DC_1-3-21_n78                   | 1                 | 0.6                    |
|                                 | 3                 | 0.8                    |
|                                 | 21                | 0.9                    |
|                                 | n78               | 0.8                    |
| DC_1-3-21_n79                   | 1                 | 0.3                    |
|                                 | 3                 | 0.8                    |
|                                 | 21                | 0.9                    |
| DC_1-3-28_n77                   | 1                 | 0.6                    |
|                                 | 3                 | 0.6                    |
|                                 | 28                | 0.6                    |
|                                 | n77               | 0.8                    |
| DC_1-3-28_n78<br>DC_1-3_n28-n78 | 1                 | 0.6                    |
|                                 | 3                 | 0.6                    |
|                                 | 28 or n28         | 0.6                    |
|                                 | n78               | 0.8                    |
| DC_1-3-28_n79                   | 1                 | 0.6                    |
|                                 | 3                 | 0.6                    |
|                                 | 28                | 0.6                    |
| DC_1-3-42_n77                   | 1                 | 0.6                    |
|                                 | 3                 | 0.6                    |
|                                 | 42                | 0.8                    |
|                                 | n77               | 0.8                    |
| DC_1-3-42_n78                   | 1                 | 0.6                    |
|                                 | 3                 | 0.6                    |
|                                 | 42                | 0.8                    |
|                                 | n78               | 0.8                    |
| DC_1-3-42_n79                   | 1                 | 0.6                    |
|                                 | 3                 | 0.6                    |
|                                 | 42                | 0.8                    |
| DC_1-5-7_n78<br>DC_1-5-7-7_n78  | 1                 | 0.6                    |
|                                 | 5                 | 0.6                    |
|                                 | 7                 | 0.6                    |
|                                 | n78               | 0.8                    |
| DC_1-7-20_n28                   | 1                 | 0.5                    |
|                                 | 7                 | 0.6                    |
|                                 | 20                | 0.6                    |
|                                 | n28               | 0.6                    |
| DC_1-7-20_n78                   | 1                 | 0.6                    |
|                                 | 7                 | 0.7                    |
|                                 | 20                | 0.4                    |
|                                 | n78               | 0.8                    |
| DC_1-7_n28-n78                  | 1                 | 0.6                    |
|                                 | 7                 | 0.6                    |
|                                 | n28               | 0.6                    |
|                                 | n78               | 0.8                    |
| DC_1-18-28_n77                  | 1                 | 0.3                    |
|                                 | 18                | 0.5                    |
|                                 | 28                | 0.5                    |
|                                 | n77               | 0.8                    |
| DC_1-18-28_n78                  | 1                 | 0.3                    |
|                                 | 18                | 0.5                    |
|                                 | 28                | 0.5                    |
|                                 | n78               | 0.8                    |
| DC_1-18-28_n79                  | 1                 | 0.3                    |

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta T_{IB,c}$ (dB) |
|--------------------------------|-------------------|------------------------|
|                                | 18                | 0.5                    |
|                                | 28                | 0.5                    |
| DC_1-19-42_n77                 | 1                 | 0.6                    |
|                                | 19                | 0.3                    |
|                                | 42                | 0.8                    |
|                                | n77               | 0.8                    |
| DC_1-19-42_n78                 | 1                 | 0.3                    |
|                                | 19                | 0.3                    |
|                                | 42                | 0.8                    |
|                                | n78               | 0.8                    |
| DC_1-19-42_n79                 | 1                 | 0.3                    |
|                                | 19                | 0.3                    |
|                                | 42                | 0.8                    |
| DC_1-20_n28-n78                | 1                 | 0.3                    |
|                                | 20                | 0.6                    |
|                                | n28               | 0.6                    |
| DC_1-21-28_n77                 | n78               | 0.8                    |
|                                | 1                 | 0.6                    |
|                                | 21                | 0.4                    |
|                                | 28                | 0.6                    |
| DC_1-21-28_n78                 | n77               | 0.8                    |
|                                | 1                 | 0.3                    |
|                                | 21                | 0.4                    |
|                                | 28                | 0.6                    |
| DC_1-21-28_n79                 | n78               | 0.8                    |
|                                | 1                 | 0.3                    |
|                                | 21                | 0.4                    |
|                                | 28                | 0.6                    |
| DC_1-21-42_n77                 | 1                 | 0.6                    |
|                                | 21                | 0.4                    |
|                                | 42                | 0.8                    |
|                                | n77               | 0.8                    |
| DC_1-21-42_n78                 | 1                 | 0.3                    |
|                                | 21                | 0.4                    |
|                                | 42                | 0.8                    |
|                                | n78               | 0.8                    |
| DC_1-21-42_n79                 | 1                 | 0.3                    |
|                                | 21                | 0.4                    |
|                                | 42                | 0.8                    |
| DC_1-28-42_n77                 | 1                 | 0.6                    |
|                                | 28                | 0.6                    |
|                                | 42                | 0.8                    |
|                                | n77               | 0.8                    |
| DC_1-28-42_n78                 | 1                 | 0.3                    |
|                                | 28                | 0.6                    |
|                                | 42                | 0.8                    |
|                                | n78               | 0.8                    |
| DC_1-28-42_n79                 | 1                 | 0.3                    |
|                                | 28                | 0.6                    |
|                                | 42                | 0.8                    |
| DC_1-41-42_n77                 | 1                 | 0.5                    |
|                                | 41                | 0.5                    |
|                                | 42                | 0.8                    |
|                                | n77               | 0.8                    |
| DC_1-41-42_n78                 | 1                 | 0.5                    |
|                                | 41                | 0.5                    |
|                                | 42                | 0.8                    |
|                                | n78               | 0.8                    |
| DC_1-41-42_n79                 | 1                 | 0.5                    |
|                                | 41                | 0.5                    |
|                                | 42                | 0.8                    |
| DC_2-66-(n)71                  | 2                 | 0.5                    |
|                                | 66                | 0.5                    |

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta T_{IB,c}$ (dB) |
|--------------------------------|-------------------|------------------------|
|                                | 71                | 0.3                    |
|                                | n71               |                        |
| DC_3-5-7_n78, DC_3-5-7-7_n78   | 3                 | 0.6                    |
|                                | 5                 | 0.6                    |
|                                | 7                 | 0.6                    |
|                                | n78               | 0.8                    |
| DC_3-7-20_n28                  | 3                 | 0.5                    |
|                                | 7                 | 0.5                    |
|                                | 20                | 0.6                    |
|                                | n28               | 0.5                    |
| DC_3-7-20_n78                  | 3                 | 0.6                    |
|                                | 7                 | 0.6                    |
|                                | 20                | 0.3                    |
|                                | n78               | 0.8                    |
| DC_3-7-28_n78                  | 3                 | 0.6                    |
|                                | 7                 | 0.6                    |
|                                | 28                | 0.6                    |
|                                | n78               | 0.8                    |
| DC_3-7_n28-n78                 | 3                 | 0.6                    |
|                                | 7                 | 0.6                    |
|                                | n28               | 0.6                    |
|                                | n78               | 0.8                    |
| DC_3-19-21_n77                 | 3                 | 0.8                    |
|                                | 19                | 0.3                    |
|                                | 21                | 0.9                    |
|                                | n77               | 0.8                    |
| DC_3-19-21_n78                 | 3                 | 0.8                    |
|                                | 19                | 0.3                    |
|                                | 21                | 0.9                    |
|                                | n78               | 0.8                    |
| DC_3-19-21_n79                 | 3                 | 0.8                    |
|                                | 19                | 0.3                    |
|                                | 21                | 0.9                    |
| DC_3-19-42_n77                 | 3                 | 0.6                    |
|                                | 19                | 0.3                    |
|                                | 42                | 0.8                    |
|                                | n77               | 0.8                    |
| DC_3-19-42_n78                 | 3                 | 0.6                    |
|                                | 19                | 0.3                    |
|                                | 42                | 0.8                    |
|                                | n78               | 0.8                    |
| DC_3-19-42_n79                 | 3                 | 0.6                    |
|                                | 19                | 0.3                    |
|                                | 42                | 0.8                    |
| DC_3-20_n28-n78                | 3                 | 0.6                    |
|                                | 20                | 0.6                    |
|                                | n28               | 0.6                    |
|                                | n78               | 0.8                    |
| DC_3-21-42_n77                 | 3                 | 0.8                    |
|                                | 21                | 0.9                    |
|                                | 42                | 0.8                    |
|                                | n77               | 0.8                    |
| DC_3-21-42_n78                 | 3                 | 0.8                    |
|                                | 21                | 0.9                    |
|                                | 42                | 0.8                    |
|                                | n78               | 0.8                    |
| DC_3-21-42_n79                 | 3                 | 0.8                    |
|                                | 21                | 0.9                    |
|                                | 42                | 0.8                    |
| DC_3-28-42_n77                 | 3                 | 0.6                    |
|                                | 28                | 0.5                    |
|                                | 42                | 0.8                    |
|                                | n77               | 0.8                    |

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta T_{IB,c}$ (dB) |
|--------------------------------|-------------------|------------------------|
| DC_3-28-42_n78                 | 3                 | 0.6                    |
|                                | 28                | 0.5                    |
|                                | 42                | 0.8                    |
|                                | n78               | 0.8                    |
| DC_3-28-42_n79                 | 3                 | 0.6                    |
|                                | 28                | 0.5                    |
|                                | 42                | 0.8                    |
| DC_7-20_n28-n78                | 7                 | 0.3                    |
|                                | 20                | 0.6                    |
|                                | n28               | 0.6                    |
|                                | n78               | 0.8                    |
| DC_19-21-42_n77                | 19                | 0.3                    |
|                                | 21                | 0.4                    |
|                                | 42                | 0.8                    |
|                                | n77               | 0.8                    |
| DC_19-21-42_n78                | 19                | 0.3                    |
|                                | 21                | 0.4                    |
|                                | 42                | 0.8                    |
|                                | n78               | 0.8                    |
| DC_19-21-42_n79                | 19                | 0.3                    |
|                                | 21                | 0.4                    |
|                                | 42                | 0.8                    |
| DC_21-28-42_n77                | 21                | 0.4                    |
|                                | 28                | 0.5                    |
|                                | 42                | 0.8                    |
|                                | n77               | 0.8                    |
| DC_21-28-42_n78                | 21                | 0.4                    |
|                                | 28                | 0.5                    |
|                                | 42                | 0.8                    |
|                                | n78               | 0.8                    |
| DC_21-28-42_n79                | 21                | 0.4                    |
|                                | 28                | 0.5                    |
|                                | 42                | 0.8                    |

6.2B.4.2.3.4  $\Delta T_{IB,c}$  for EN-DC five bands

Table 6.2B.4.2.3.4-1:  $\Delta T_{IB,c}$  due to EN-DC (five bands)

| Inter-band EN-DC configuration      | E-UTRA or NR Band | $\Delta T_{IB,c}$ (dB) |
|-------------------------------------|-------------------|------------------------|
| DC_1-3-5-7_n78,<br>DC_1-3-5-7-7_n78 | 1                 | 0.6                    |
|                                     | 3                 | 0.6                    |
|                                     | 5                 | 0.6                    |
|                                     | 7                 | 0.6                    |
|                                     | n78               | 0.8                    |
| DC_1-3-7-20_n28                     | 1                 | 0.6                    |
|                                     | 3                 | 0.6                    |
|                                     | 7                 | 0.6                    |
|                                     | 20                | 0.6                    |
|                                     | n28               | 0.6                    |
| DC_1-3-7-20_n78                     | 1                 | 0.6                    |
|                                     | 3                 | 0.6                    |
|                                     | 7                 | 0.6                    |
|                                     | 20                | 0.6                    |
|                                     | n78               | 0.6                    |
| DC_1-3-7_n28-n78                    | 1                 | 0.7                    |
|                                     | 3                 | 0.7                    |
|                                     | 7                 | 0.7                    |
|                                     | n28               | 0.6                    |
|                                     | n78               | 0.8                    |

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta T_{IB,c}$ (dB) |
|--------------------------------|-------------------|------------------------|
| DC_1-3-19-21_n77               | 1                 | 0.6                    |
|                                | 3                 | 0.8                    |
|                                | 19                | 0.3                    |
|                                | 21                | 0.9                    |
|                                | n77               | 0.8                    |
| DC_1-3-19-21_n78               | 1                 | 0.6                    |
|                                | 3                 | 0.8                    |
|                                | 19                | 0.3                    |
|                                | 21                | 0.9                    |
|                                | n78               | 0.8                    |
| DC_1-3-19-21_n79               | 1                 | 0.3                    |
|                                | 3                 | 0.8                    |
|                                | 19                | 0.3                    |
|                                | 21                | 0.9                    |
| DC_1-3-19-42_n77               | 1                 | 0.6                    |
|                                | 3                 | 0.6                    |
|                                | 19                | 0.3                    |
|                                | 42                | 0.8                    |
|                                | n77               | 0.8                    |
| DC_1-3-19-42_n78               | 1                 | 0.6                    |
|                                | 3                 | 0.6                    |
|                                | 19                | 0.3                    |
|                                | 42                | 0.8                    |
|                                | n78               | 0.8                    |
| DC_1-3-19-42_n79               | 1                 | 0.6                    |
|                                | 3                 | 0.6                    |
|                                | 19                | 0.3                    |
|                                | 42                | 0.8                    |
| DC_1-3-20_n28-n78              | 1                 | 0.6                    |
|                                | 3                 | 0.6                    |
|                                | 20                | 0.6                    |
|                                | n28               | 0.6                    |
|                                | n78               | 0.8                    |
| DC_1-3-21-42_n77               | 1                 | 0.6                    |
|                                | 3                 | 0.8                    |
|                                | 21                | 0.9                    |
|                                | 42                | 0.8                    |
|                                | n77               | 0.6                    |
| DC_1-3-21-42_n78               | 1                 | 0.6                    |
|                                | 3                 | 0.8                    |
|                                | 21                | 0.9                    |
|                                | 42                | 0.8                    |
|                                | n78               | 0.6                    |
| DC_1-3-21-42_n79               | 1                 | 0.6                    |
|                                | 3                 | 0.8                    |
|                                | 21                | 0.9                    |
|                                | 42                | 0.8                    |
| DC_1-3-28-42_n77               | 1                 | 0.6                    |
|                                | 3                 | 0.6                    |
|                                | 28                | 0.6                    |
|                                | 42                | 0.8                    |
|                                | n77               | 0.8                    |
| DC_1-3-28-42_n78               | 1                 | 0.6                    |
|                                | 3                 | 0.6                    |
|                                | 28                | 0.6                    |
|                                | 42                | 0.8                    |
|                                | n78               | 0.8                    |
| DC_1-3-28-42_n79               | 1                 | 0.6                    |

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta T_{IB,c}$ (dB) |
|--------------------------------|-------------------|------------------------|
|                                | 3                 | 0.6                    |
|                                | 28                | 0.6                    |
|                                | 42                | 0.8                    |
| DC_1-7-20_n28-n78              | 1                 | 0.6                    |
|                                | 7                 | 0.7                    |
|                                | 20                | 0.6                    |
|                                | n28               | 0.6                    |
|                                | n78               | 0.8                    |
| DC_1-19-21-42_n77              | 1                 | 0.3                    |
|                                | 19                | 0.3                    |
|                                | 21                | 0.4                    |
|                                | 42                | 0.8                    |
|                                | n77               | 0.8                    |
| DC_1-19-21-42_n78              | 1                 | 0.3                    |
|                                | 19                | 0.3                    |
|                                | 21                | 0.4                    |
|                                | 42                | 0.8                    |
|                                | n78               | 0.8                    |
| DC_1-19-21-42_n79              | 1                 | 0.3                    |
|                                | 19                | 0.3                    |
|                                | 21                | 0.4                    |
|                                | 42                | 0.8                    |
|                                | n79               | 0.8                    |
| DC_1-21-28-42_n77              | 1                 | 0.6                    |
|                                | 21                | 0.4                    |
|                                | 28                | 0.6                    |
|                                | 42                | 0.8                    |
|                                | n77               | 0.8                    |
| DC_1-21-28-42_n78              | 1                 | 0.3                    |
|                                | 21                | 0.4                    |
|                                | 28                | 0.6                    |
|                                | 42                | 0.8                    |
|                                | n78               | 0.8                    |
| DC_1-21-28-42_n79              | 1                 | 0.3                    |
|                                | 21                | 0.4                    |
|                                | 28                | 0.6                    |
|                                | 42                | 0.8                    |
|                                | n79               | 0.8                    |
| DC_3-7-20_n28-n78              | 3                 | 0.6                    |
|                                | 7                 | 0.6                    |
|                                | 20                | 0.6                    |
|                                | n28               | 0.6                    |
|                                | n78               | 0.8                    |

## 6.2B.4.2.3.5

 $\Delta T_{IB,c}$  for EN-DC six bands**Table 6.2B.4.2.3.5-1:  $\Delta T_{IB,c}$  due to EN-DC (six bands)**

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta T_{IB,c}$ (dB) |
|--------------------------------|-------------------|------------------------|
| DC_1-3-7-20_n28-n78            | 1                 | 0.7                    |
|                                | 3                 | 0.7                    |
|                                | 7                 | 0.7                    |
|                                | 20                | 0.6                    |
|                                | n28               | 0.6                    |
|                                | n78               | 0.8                    |

### 6.2B.4.2.3a Inter-band NE-DC within FR1

Unless  $\Delta T_{IB,c}$  is specified in this clause, the value of  $\Delta T_{IB,c}$  for the correspondingly specified EN-DC configuration in clause 6.2B.4.2.3 is applicable.

### 6.2B.4.2.4 Inter-band EN-DC including FR2

#### 6.2B.4.2.4.1 $\Delta T_{IB,c}$ for EN-DC two bands

Unless otherwise stated,  $\Delta T_{IB,c}$  for E-UTRA and FR2 NR bands of inter-band EN-DC combinations defined in table 5.5B.5.1-1 is set to zero.

#### **Table 6.2B.4.2.4.1-1: Void**

#### 6.2B.4.2.4.2 $\Delta T_{IB,c}$ for EN-DC three bands

Unless otherwise stated,  $\Delta T_{IB,c}$  for FR2 NR bands is set to zero, and  $\Delta T_{IB,c}$  for constituent E-UTRA bands for inter-band EN-DC defined in table 5.5B.5.2-1 is the same as those for the corresponding E-UTRA CA configuration specified in TS 36.101 [4], without the FR2 NR bands.

#### **Table 6.2B.4.2.4.2-1: Void**

#### 6.2B.4.2.4.3 $\Delta T_{IB,c}$ for EN-DC four bands

Unless otherwise stated,  $\Delta T_{IB,c}$  for FR2 NR bands is set to zero, and  $\Delta T_{IB,c}$  for constituent E-UTRA bands for inter-band EN-DC defined in table 5.5B.5.3-1 is the same as those for the corresponding E-UTRA CA configuration specified in TS 36.101 [4], without the FR2 NR bands.

#### **Table 6.2B.4.2.4.3-1: Void**

#### 6.2B.4.2.4.4 $\Delta T_{IB,c}$ for EN-DC five bands

Unless otherwise stated,  $\Delta T_{IB,c}$  for FR2 NR bands is set to zero, and  $\Delta T_{IB,c}$  for constituent E-UTRA bands for inter-band EN-DC defined in table 5.5B.5.4-1 is the same as those for the corresponding E-UTRA CA configuration specified in TS 36.101 [4], without the FR2 NR bands.

#### **Table 6.2B.4.2.4.4-1: Void**

#### 6.2B.4.2.4.5 Void

### 6.2B.4.2.5 Inter-band EN-DC including both FR1 and FR2

#### 6.2B.4.2.5.1 $\Delta T_{IB,c}$ for EN-DC three bands

Unless otherwise stated, for inter-band EN-DC configurations defined in table 5.5B.6.2-1,  $\Delta T_{IB,c}$  for constituent FR2 NR bands is set to zero, and  $\Delta T_{IB,c}$  for constituent E-UTRA and FR1 NR bands is the same as those for the corresponding inter band EN-DC configuration without the FR2 bands specified in 6.2B.4.2.3.

#### **Table 6.2B.4.2.5.1-1: Void**

#### 6.2B.4.2.5.2 $\Delta T_{IB,c}$ for EN-DC four bands

Unless otherwise stated, for inter-band EN-DC configurations defined in table 5.5B.6.3-1,  $\Delta T_{IB,c}$  for constituent FR2 NR bands is set to zero, and  $\Delta T_{IB,c}$  for constituent E-UTRA and FR1 NR bands is the same as those for the corresponding inter band EN-DC configuration without the FR2 bands specified in 6.2B.4.2.3.



#### 6.2B.4.2.5.3 $\Delta T_{IB,c}$ for EN-DC five bands

Unless otherwise stated, for inter-band EN-DC configurations defined in table 5.5B.6.4-1,  $\Delta T_{IB,c}$  for constituent FR2 NR bands is set to zero, and  $\Delta T_{IB,c}$  for constituent E-UTRA and FR1 NR bands is the same as those for the corresponding inter band EN-DC configuration without the FR2 bands specified in 6.2B.4.2.3.

#### 6.2B.4.2.5.4 $\Delta T_{IB,c}$ for EN-DC six bands

Unless otherwise stated, for inter-band EN-DC configurations defined in table 5.5B.6.5-1,  $\Delta T_{IB,c}$  for constituent FR2 NR bands is set to zero, and  $\Delta T_{IB,c}$  for constituent E-UTRA and FR1 NR bands is the same as those for the corresponding inter band EN-DC configuration without the FR2 bands specified in 6.2B.4.2.3.

### 6.2B.5 Configured output power for NR-DC

#### 6.2B.5.1 Configured output power level

##### 6.2B.5.1.1 Inter-band NR-DC between FR1 and FR2

For synchronous inter-band NR-DC [12] with MCG in FR1 and SCG in FR2 combined with one uplink serving cell per CG, the UE is allowed to set its configured maximum output power  $P_{CMAX,c(i),i}$  for serving cell  $c(i)$  of CG  $i$ ,  $i = 1, 2$  as specified in clause 6.2.4 of TS 38.101-1 [2] and clause 6.2.4 TS 38.101-2 [3] independently.

## 6.3 Output power dynamics

Output power dynamics for EN-DC operations in FR1 and FR2 as specified in TS 38.101-1 [2] and TS 38.101-2 [3], respectively. E-UTRA as specified in TS 36.101 [4]. For intra-band contiguous EN-DC operation in FR1, minimum output power requirements specified in clause 6.3.1 of TS 38.101-1 [2] and clause 6.3.2 of TS 36.101 [4] shall only apply when the power of all NR and E-UTRA carriers are set to minimum value. Similarly, OFF power requirements specified in clause 6.3.2 of TS 38.101-1 [2] and clause 6.3.3 of TS 36.101 [4] shall only apply when the power of all NR and E-UTRA carriers are OFF. The OFF power condition in transmit ON/OFF time mask requirements specified in clause 6.3.3 of TS 38.101-1 [2] and clause 6.3.4 of TS 36.101 [4] is applicable only when all NR and E-UTRA carriers are OFF. If both E-UTRA and NR transition between ON and OFF states simultaneously, the longer transient time shall apply to both. If either E-UTRA or NR is OFF and the other carrier transitions from OFF to ON, then the transient time associated with that carrier applies.

### 6.3A Output power dynamics for CA

For inter-band NR CA between FR1 and FR2, output power dynamics as specified in TS 38.101-1 [2] and TS 38.101-2 [3] apply for FR1 and FR2 respectively.

### 6.3B Output power dynamics for DC

#### 6.3B.0 General

The E-UTRA and NR switching time mask defines the observation period between E-UTRA subframe and NR slot/mini-slot boundary. Both E-UTRA subframe and NR slot/mini-slot have ON power transmissions. The ON power is defined as the mean power over the symbol duration excluding any transient period. For E-UTRA subframe or NR slot/mini-slot having OFF power transmission, the general time mask for E-UTRA or NR shall apply.

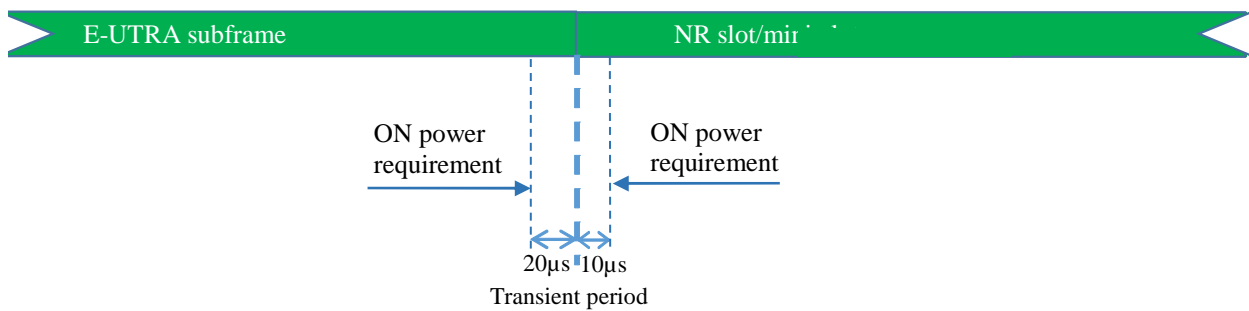
For inter-band EN-DC, output power dynamics requirement for E-UTRA single carrier and CA operation specified in clauses 6.3 and 6.3A of TS 36.101 [4] and for NR single carrier and CA operation specified in clause 6.3 and 6.3A of TS 38.101-1 [2] and for NR single carrier, CA operation and UL-MIMO specified in clause 6.3, 6.3A and 6.3D of TS 38.101-2 [3] apply.

### 6.3B.1 Output power dynamics for EN-DC with UL sharing from UE perspective

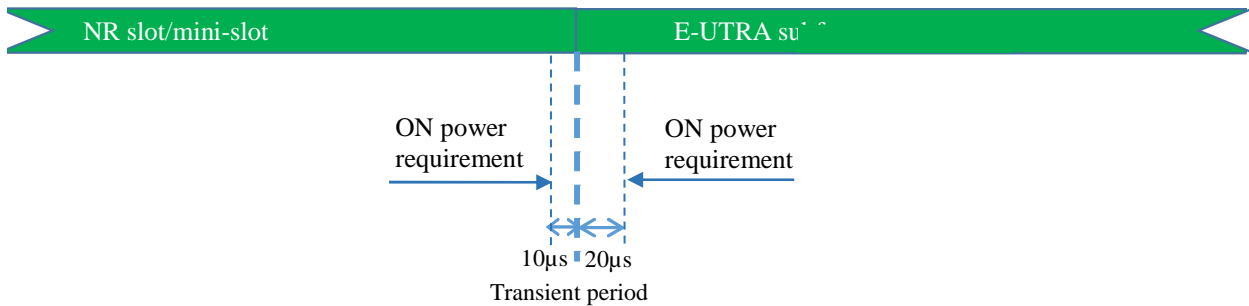
#### 6.3B.1.1 E-UTRA and NR switching time mask for TDM based UL sharing from UE perspective

The E-UTRA and NR switching time mask is applicable for non-simultaneous transmissions between E-UTRA and NR in TDM based UL sharing from the UE perspective in the same channel, which is shared by E-UTRA and NR .

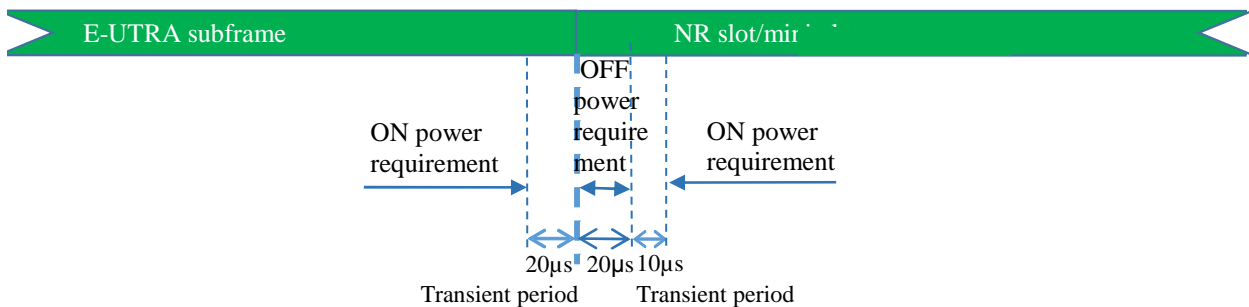
For UEs reporting E-UTRA and NR switching time capability of type 1 with switching time < 0.5 us for TDM based UL sharing from UE perspective within FR1 time masks in Figure 6.3B.1.1-1 and Figure 6.3B.1.1-2 shall apply. For UEs reporting E-UTRA and NR switching time capability of type 2 with switching time < 20 us for TDM based UL sharing from UE perspective within FR1, time masks in Figure 6.3B.1.1-3 and Figure 6.3B.1.1-4 shall apply.



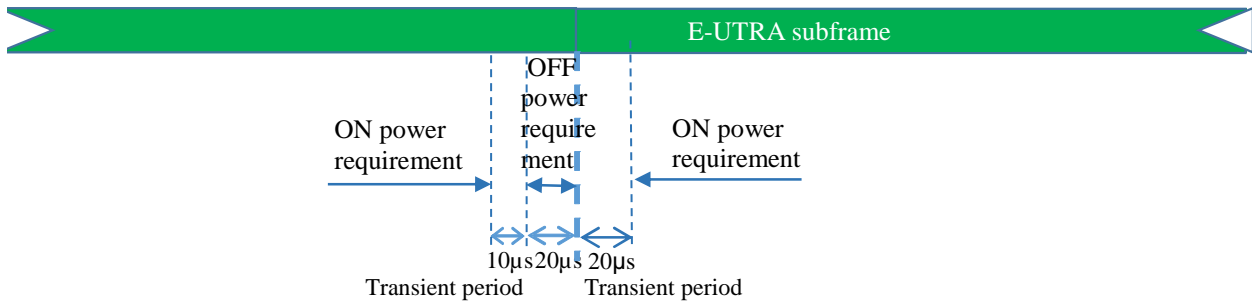
**Figure 6.3B.1.1-1: E-UTRA to NR switching time mask for type 1 for TDM based UL sharing from UE perspective within FR1**



**Figure 6.3B.1.1-2: NR to E-UTRA switching time mask for type 1 for TDM based UL sharing from UE perspective within FR1**



**Figure 6.3B.1.1-3: E-UTRA to NR switching time mask for type 2 for TDM based UL sharing from UE perspective within FR1**



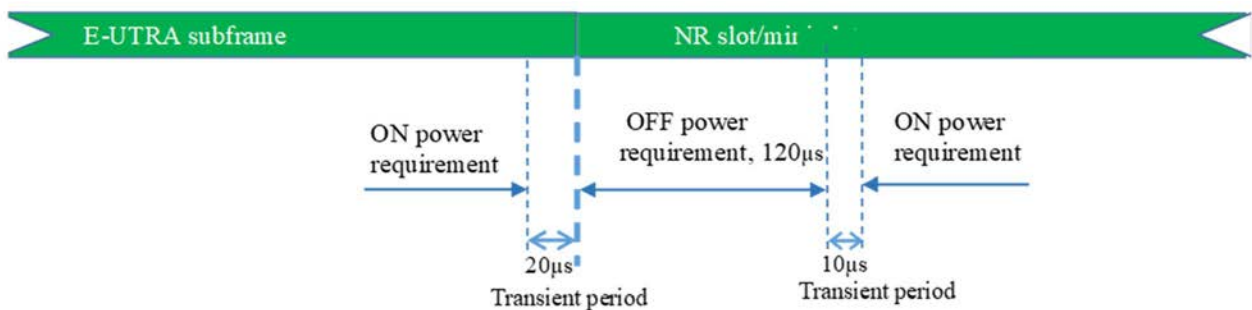
**Figure 6.3B.1.1-4: NR to E-UTRA switching time mask for type 2 for TDM based UL sharing from UE perspective within FR1**

### 6.3B.1a Output power dynamics for NE-DC with UL sharing from UE perspective

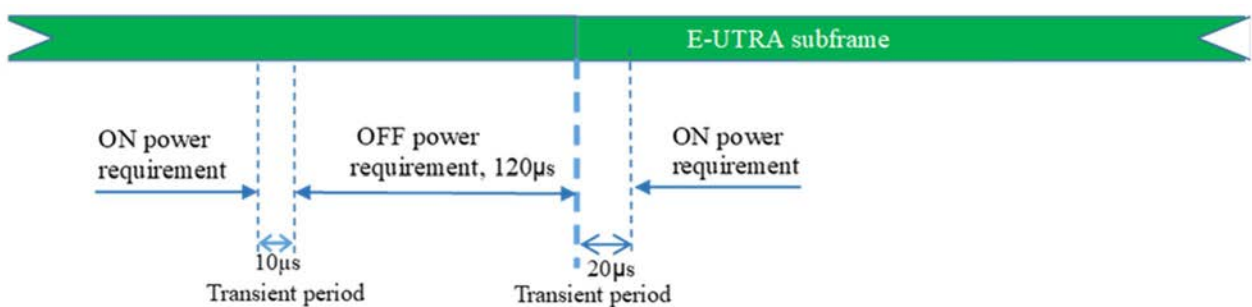
The E-UTRA and NR switching time mask is applicable for non-simultaneous transmissions between E-UTRA and NR in TDM based UL sharing from the UE perspective in the same channel, which is shared by E-UTRA and NR. Unless otherwise specified, the 6.3B.1.1 clauses for NE-DC are applicable.

### 6.3B.2 Output power dynamics for intra-band EN-DC without dual PA capability

For intra-band contiguous EN-DC configurations DC\_(n)41 and DC\_(n)71, and all intra-band non-contiguous EN-DC configurations without dual PA capability, maximum UL switching time is defined as 120 µs and DL reception interruption is allowed during UL switching. Time masks in Figure 6.3B.2-1 and Figure 6.3B.2-2 shall apply. Unless otherwise stated, for other intra-band contiguous EN-DC configurations, the switching time in 6.3B.1.1 applies.



**Figure 6.3B.2-1: E-UTRA to NR switching time mask for intra-band EN-DC without dual PA capability when single UL is allowed**



**Figure 6.3B.2-2: NR to E-UTRA switching time mask for intra-band EN-DC without dual PA capability when single UL is allowed**

### 6.3B.3 Output power dynamics for intra-band EN-DC with dual PA capability

For both intra-band contiguous and non-contiguous EN-DC with dual PA capability, time masks in Figure 6.3B.3-1 and Figure 6.3B.3-2 shall apply.

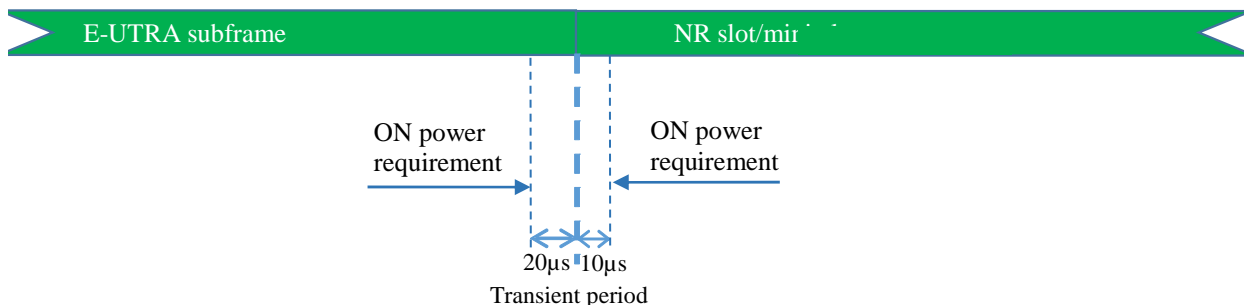


Figure 6.3B.3-1: E-UTRA to NR switching time mask for intra-band EN-DC with dual PA capability

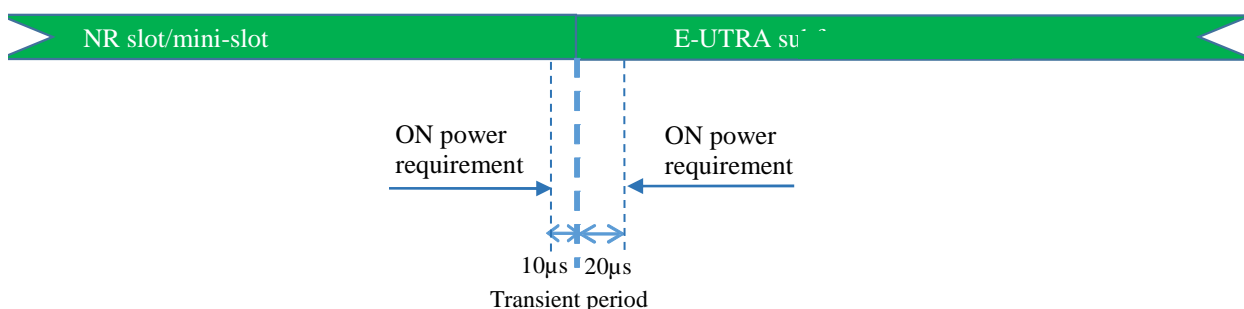


Figure 6.3B.3-2: NR to E-UTRA switching time mask for intra-band EN-DC with dual PA capability

## 6.4 Void

### 6.4A Transmit signal quality for CA

#### 6.4A.1 Frequency error for CA

For inter-band NR CA between FR1 and FR2, frequency error as specified in TS 38.101-1 [2] and TS 38.101-2 [3] apply for FR1 and FR2 respectively.

#### 6.4A.2 Transmit modulation quality for CA

For inter-band NR CA between FR1 and FR2, transmit modulation quality as specified in TS 38.101-1 [2] and TS 38.101-2 [3] apply for FR1 and FR2 respectively.

## 6.4B Transmit signal quality for DC

### 6.4B.1 Frequency error for DC

#### 6.4B.1.1 Frequency error for Intra-band contiguous EN-DC

For intra-band contiguous EN-DC, the requirement shall apply on each component carrier as defined in clause 6.5.1 in TS 36.101 [4] and in clause 6.4.1 in TS 38.101-1 [2], respectively.

#### 6.4B.1.2 Frequency error for Intra-band non-contiguous EN-DC

For intra-band non-contiguous EN-DC, the requirement shall apply on each component carrier as defined in clause 6.5.1 in TS 36.101 [4] and in clause 6.4.1 in TS 38.101-1 [2], respectively.

#### 6.4B.1.3 Frequency error for inter-band EN-DC within FR1

For inter-band EN-DC with uplink assigned to one E-UTRA band and one NR band, the requirements shall apply on each component carrier as defined in clause 6.5.1 in TS 36.101 [4] and in clause 6.4.1 in TS 38.101-1 [2], respectively, with all component carriers active. If multiple component carriers are assigned to one E-UTRA band, the requirements in clauses 6.5.1A in TS 36.101 [4] apply for those component carriers.

#### 6.4B.1.3a Frequency error for inter-band NE-DC within FR1

For inter-band NE-DC with uplink assigned to one E-UTRA band and one NR band, the requirements shall apply on each component carrier as defined in clause 6.5.1 in TS 36.101 [4] and in clause 6.4.1 in TS 38.101-1 [2], respectively, with all component carriers active. If multiple component carriers are assigned to one E-UTRA band, the requirements in clauses 6.5.1A in TS 36.101 [4] apply for those component carriers, and if multiple component carriers are assigned to one NR band, the requirements in clauses 6.4A.1 in TS 38.101-1 [2] apply for those component carriers.

#### 6.4B.1.4 Frequency error for inter-band EN-DC including FR2

Frequency error requirement for E-UTRA single carrier and CA operation specified in clauses 6.5.1 and 6.5.1A of TS 36.101 [4] and for NR single carrier, CA operation and UL-MIMO specified in clause 6.4.1, 6.4A.1 and 6.4D.1 of TS 38.101-2 [3] apply.

#### 6.4B.1.5 Frequency error for inter-band EN-DC including both FR1 and FR2

Frequency error requirement for E-UTRA single carrier and CA operation specified in clauses 6.5.1 and 6.5.1A of TS 36.101 [4] and for NR single carrier and CA operation specified in clause 6.4.1 and 6.4A.1 of TS 38.101-1 [2] and for NR single carrier, CA operation and UL-MIMO specified in clause 6.4.1, 6.4A.1 and 6.4D.1 of TS 38.101-2 [3] apply.

### 6.4B.2 Transmit modulation quality for DC

#### 6.4B.2.1 Transmit modulation quality for Intra-band contiguous EN-DC

##### 6.4B.2.1.1 Error Vector Magnitude

For the intra-band contiguous EN-DC with one component carrier per CG the EVM requirement applies with PRB allocation in one of the CG and the other CG unallocated.

The EVM requirements for each CG are according to clause 6.5.2 of TS 36.101 [4] for the MCG and 6.4.2 of TS 38.101-1 [2] for the SCG with EN-DC configured.

##### 6.4B.2.1.2 Carrier leakage

The carrier leakage requirements for each CG are according to clause 6.5.2 of TS 36.101 [4] for the MCG and 6.4.2 of TS 38.101-1 [2] for the SCG with EN-DC configured.

### 6.4B.2.1.3 In-band emissions

For the MCG the in-band emission requirements in Table 6.5.2A.3.1-1 and 6.5.2A.3.1-2 in TS 36.101 [4] apply within the aggregated transmission bandwidth configuration of the EN-DC bandwidth with the carriers of both CGs active and one single contiguous PRB allocation of bandwidth  $L_{CRB}$  within the MCG at the edge of the said aggregated transmission bandwidth configuration.

For the SCG the in-band emission requirements in Table 6.4.2.3-1 in TS 38.101-1 [2] apply within the aggregated transmission bandwidth configuration of the EN-DC bandwidth with the carriers of both CGs active and one single contiguous PRB allocation of bandwidth  $L_{CRB}$  within the SCG at the edge of the aggregated transmission bandwidth configuration.

## 6.4B.2.2 Transmit modulation quality for Intra-band non-contiguous EN-DC

### 6.4B.2.2.1 Error Vector Magnitude

For the intra-band non-contiguous EN-DC with one component carrier per CG the EVM requirement applies with PRB allocation in one of the CG and the other CG unallocated.

The EVM requirements for each CG are according to clause 6.5.2 of TS 36.101 [4] for the MCG and 6.4.2 of TS 38.101-1 [2] for the SCG with EN-DC configured.

### 6.4B.2.2.2 Carrier leakage

The carrier leakage requirements for each CG are according to clause 6.5.2 of TS 36.101 [4] for the MCG and 6.4.2 of TS 38.101-1 [2] for the SCG with EN-DC configured and PRB allocation only in the CG being measured.

### 6.4B.2.2.3 In-band emissions

For the MCG the in-band emission requirements in Table 6.5.2A.3.1-1 and 6.5.2A.3.1-2 in TS 36.101 [4] apply within the transmission bandwidth configuration of the MCG with the carriers of both CGs active and one single contiguous PRB allocation of bandwidth  $L_{CRB}$  within the MCG at the edge of the transmission bandwidth configuration.

For the SCG the in-band emission requirements in Table 6.4.2.3-1 in TS 38.101-1 [2] apply within the transmission bandwidth configuration of the SCG with the carriers of both CGs active and one single contiguous PRB allocation of bandwidth  $L_{CRB}$  within the SCG at the edge of the transmission bandwidth configuration.

## 6.4B.2.3 Transmit modulation quality for Inter-band EN-DC within FR1

For inter-band EN-DC with uplink assigned to one E-UTRA band and one NR band, the requirements shall apply on each component carrier as defined in clause 6.5.2 in TS 36.101 [4] and in clause 6.4.2 in TS 38.101-1 [2], respectively, with all component carriers active, applies with PRB allocation in one of the CG and the other CG unallocated. If multiple component carriers are assigned to one E-UTRA band, the requirements in subclauses 6.5.2A in TS 36.101 [4] apply for those component carriers.

### 6.4B.2.3a Transmit modulation quality for Inter-band NE-DC within FR1

For inter-band NE-DC with uplink assigned to one E-UTRA band and one NR band, the requirements shall apply on each component carrier as defined in clause 6.5.2 in TS 36.101 [4] and in clause 6.4.2 in TS 38.101-1 [2], respectively, with all component carriers active, applies with PRB allocation in one of the CG and the other CG unallocated. If multiple component carriers are assigned to one E-UTRA band, the requirements in subclauses 6.5.2A in TS 36.101 [4] apply for those component carriers, and if multiple component carriers are assigned to one NR band, the requirements in subclauses 6.4A.2 in TS 38.101-1 [2] apply for those component carriers.

## 6.4B.2.4 Transmit modulation quality for Inter-band EN-DC including FR2

Transmit modulation quality requirement for E-UTRA single carrier and CA operation specified in clauses 6.5.2 and 6.5.2A of TS 36.101 [4] and for NR single carrier, CA operation and UL-MIMO specified in clause 6.4.2, 6.4A.2 and 6.4D.2 of TS 38.101-2 [3] apply.

### 6.4B.2.5 Transmit modulation quality for inter-band EN-DC including both FR1 and FR2

Transmit modulation quality requirement for E-UTRA single carrier and CA operation specified in clauses 6.5.2 and 6.5.2A of TS 36.101 [4] and for NR single carrier and CA operation specified in clause 6.4.2 and 6.4A.2 of TS 38.101-1 [2] and for NR single carrier, CA operation and UL-MIMO specified in clause 6.4.2, 6.4A.2 and 6.4D.2 of TS 38.101-2 [3] apply.

## 6.5 Void

### 6.5A Output RF spectrum emissions for CA

#### 6.5A.1 Occupied bandwidth for CA

For inter-band NR CA between FR1 and FR2, occupied bandwidth specified in TS 38.101-1 [2] and TS 38.101-2 [3] apply for each frequency range respectively.

#### 6.5A.2 Out-of-band emissions for CA

For inter-band NR CA between FR1 and FR2, out-of-band emissions specified in TS 38.101-1 [2] and TS 38.101-2 [3] apply for each frequency range respectively.

#### 6.5A.3 Spurious emissions for CA

##### 6.5A.3.1 Inter-band CA between FR1 and FR2

Unless otherwise stated, for inter-band CA between FR1 and FR2, spurious emission and UE co-existence requirements specified in TS 38.101-1 [2] and TS 38.101-2 [3] apply for each component carrier respectively.

**Table 6.5A.3.1-1: Void**

#### 6.5A.4 Transmit intermodulation for CA

For inter-band NR CA between FR1 and FR2, transmit intermodulation specified in TS 38.101-1 [2] apply for each component carrier for NR FR1.

### 6.5B Output RF spectrum emissions for DC

#### 6.5B.1 Occupied bandwidth for EN-DC

##### 6.5B.1.1 Intra-band contiguous EN-DC

For intra-band contiguous EN-DC the occupied bandwidth is a measure of the bandwidth containing 99% of the total integrated power of the transmitted spectrum. The OBW shall be less than the aggregated channel bandwidth for EN-DC, denoted as ENBW in clause 5.3B.

##### 6.5B.1.2 Intra-band non-contiguous EN-DC

For intra-band non-contiguous EN-DC, occupied bandwidth requirement for E-UTRA single carrier and CA operation specified in clauses 6.6.1 and 6.6.1A of TS 36.101 [4] and for NR single carrier specified in clause 6.5.1 of TS 38.101-1 [2] apply.

##### 6.5B.1.3 Inter-band EN-DC within FR1

Occupied bandwidth requirement for E-UTRA single carrier and CA operation specified in clauses 6.6.1 and 6.6.1A of TS 36.101 [4] and for NR single carrier specified in clause 6.5.1 of TS 38.101-1 [2] apply.

### 6.5B.1.4 Inter-band EN-DC including FR2

Occupied bandwidth requirement for E-UTRA single carrier and CA operation specified in clauses 6.6.1 and 6.6.1A of TS 36.101 [4] and for NR single carrier, CA operation and UL-MIMO specified in clause 6.5.1, 6.5A.1 and 6.5D.1 of TS 38.101-2 [3] apply.

### 6.5B.1.5 Inter-band EN-DC including both FR1 and FR2

Occupied bandwidth requirement for E-UTRA single carrier and CA operation specified in clauses 6.6.1 and 6.6.1A of TS 36.101 [4] and for NR single carrier and CA operation specified in clause 6.5.1 and 6.5A.1 of TS 38.101-1 [2] and for NR single carrier, CA operation and UL-MIMO specified in clause 6.5.1, 6.5A.1 and 6.5D.1 of TS 38.101-2 [3] apply.

## 6.5B.2 Out-of-band emissions for DC

### 6.5B.2.1 Intra-band contiguous EN-DC

The out of band emissions are unwanted emissions immediately outside the EN-DC aggregated 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.

Unless otherwise stated, the OOB limits specified for the DC combination in this clause supercede any OOB requirements specified for each sub-block in the respective TS 36.101 [4] and TS 38.101-1 [2].

The requirements apply to the sum of transmissions across all antenna connectors.

#### 6.5B.2.1.1 Spectrum emissions mask

The spectrum emission mask of the UE applies to frequencies ( $\Delta f_{\text{OOB}}$ ) starting from the  $\pm$  edge of the EN-DC aggregated channel bandwidth. For frequencies offset greater than  $\Delta f_{\text{OOB}}$  as specified in Table 6.5B.2.1.1-1 the spurious requirements in clause 6.5B.3 are applicable.

The general spectrum emission for intra-band contiguous EN-DC is specified in Table 6.5B.2.1.1-1.

The power of any UE emission shall not exceed the levels specified in Table 6.5B.2.1.1-1 for the specified EN-DC aggregated channel bandwidth.

**Table 6.5B.2.1.1-1. General spectrum emission mask for intra-band contiguous EN-DC**

| $\Delta f_{\text{OOB}}$<br>(MHz)  | Spectrum emission limit (dBm)                                    | Measurement bandwidth |
|---|--|-----------------------|
| $\pm 0 - 1$   | $\text{Max}(\text{Round}(10 \cdot \log(0.15/\text{ENBW})), -24)$ | 30 kHz                |
| $\pm 1 - 5$   | -10  | 1 MHz                 |
| $\pm 5 - \text{ENBW}$   | -13  | 1 MHz                 |
| $\pm \text{ENBW} - (\text{ENBW} + 5)$   | -25  | 1 MHz                 |
| NOTE: ENBW refers to the aggregated channel bandwidth in MHz as defined in clause 5.3B. |  |                       |

#### 6.5B.2.1.2 Additional spectrum emissions mask

##### 6.5B.2.1.2.1 Requirements for network signalled value "NS\_35"

When NS\_35 is indicated in the MCG and NS\_35 is indicated in the SCG, the requirements in Table 6.5B.2.1.2.1-1 apply in the frequency ranges immediately adjacent and outside the aggregated sub-blocks of the EN-DC configuration for DC\_(n)71AA.

**Table 6.5B.2.1.2.1-1: Additional requirements**

| $\Delta f_{\text{OOB}}$<br>(MHz) | Frequency offset of measurement filter centre frequency, $f_{\text{offset}}$ | Minimum requirement (dBm) | Measurement bandwidth |
|----------------------------------|--|---------------------------|-----------------------|
|----------------------------------|--|---------------------------|-----------------------|



|  |  |     |         |
|--|--|-----|---------|
| $0 \text{ MHz} \leq \Delta f < 0.1 \text{ MHz}$  | $0.015 \text{ MHz} \leq f_{\text{offset}} < 0.085 \text{ MHz}$                         | -13 | 30 kHz  |
| $0.1 \text{ MHz} \leq \Delta f < \text{ENBW}$  | $0.15 \text{ MHz} \leq f_{\text{offset}} < \text{ENBW} - 0.05 \text{ MHz}$             | -13 | 100 kHz |
| $\text{ENBW} \leq \Delta f < \text{ENBW} + 5 \text{ MHz}$  | $\text{ENBW} + 0.5 \text{ MHz} \leq f_{\text{offset}} < \text{ENBW} + 4.5 \text{ MHz}$ | -25 | 1 MHz   |
| NOTE 1: ENBW is the aggregated bandwidth of an E-UTRA sub-block and an adjacent NR sub-block; there is no frequency separation between the said sub-blocks. The sub-block bandwidths include any internal guard bands. |  |     |         |

6.5B.2.1.2.2 Requirements for network signalled 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 Band 41/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. Since the 26 dB emission bandwidth is implementation dependent, the transmission bandwidths occupied by RBs is used for the SEM. The emission bandwidth for E-UTRA carriers is document in TS 36.101 [4], and the emission bandwidth for NR carriers is documented in TS 38.101-1 [2]. The total emission bandwidth for contiguous intra-band EN-DC is the sum of the emission bandwidth for each CC plus the guard band between contiguous CCs.

When "NS\_04" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5B.2.1.2.2-1.

Table 6.5B.2.1.2.2-1: DC\_(n)41 SEM with NS\_04

| $\Delta f_{\text{OoB}}$<br>MHz  | Spectrum emission limit (dBm) / measurement bandwidth for each ENBW |        |        |        |          | Measurement bandwidth |
|---|---|--------|--------|--------|----------|-----------------------|
|   | 15 MHz  | 20 MHz | 40 MHz | 50 MHz | > 50 MHz |                       |
| $\pm 0 - 1$   | -10   | -10    | -10    |        |          | 2 % ENBW              |
|   |   |        |        | -10    |          | 1 MHz                 |
| $\pm 1 - 5$   | -10   |        |        |        |          | 1 MHz                 |
| $\pm 5 - X$   | -13   |        |        |        |          |                       |
| $\pm X - (\text{ENBW} + 5 \text{ MHz})$   | -25   |        |        |        |          |                       |
| NOTE: X is defined as the sum of the emission bandwidth of the component carriers plus the guard band between contiguous CCs. |   |        |        |        |          |                       |

6.5B.2.1.3 Adjacent channel leakage ratio

For EN-DC operation with an E-UTRA sub-block immediately adjacent to an NR sub-block, the ACLR is defined as the ratio of the filtered mean power centred on the aggregated sub-block bandwidth ENBW to the filtered mean power centred on an adjacent bandwidth of the same size ENBW at nominal channel spacing. The UE shall meet the ACLR minimum requirement EN-DC<sub>ACLR</sub> specified in Table 6.5B.2.1.3-1 with ENBW the sum of the sub-block bandwidths.

The assigned channel power and adjacent channel power are measured with rectangular filters with measurement bandwidths specified in 6.5B.2.1.3-1.

Table 6.5B.2.1.3-1: ACLR for intra-band EN-DC (contiguous sub-blocks)

| Parameter   | Unit | Value              |
|---|------|--------------------|
| EN-DC <sub>ACLR</sub> for PC3   | dBc  | 30                 |
| EN-DC <sub>ACLR</sub> for PC2   | dBc  | 31                 |
| Measurement bandwidth of EN-DC channel  |      | 1.00*ENBW          |
| Measurement bandwidth of adjacent channel   |      | 0.95*ENBW          |
| Frequency offset of adjacent channel  |      | ENBW<br>/<br>-ENBW |
| NOTE 1: ENBW is the aggregated bandwidth in MHz as defined in clause 5.3B.                        |      |                    |
| NOTE 2: The frequency offset is that in between the centre frequencies of the measurement filters |      |                    |

## 6.5B.2.2 Intra-band non-contiguous EN-DC

### 6.5B.2.2.1 Spectrum emissions mask

The spectral emission mask for intra-band non-contiguous EN-DC is a composite of the emission mask for each CC with the level set to the maximum value from each mask for each frequency outside of the transmission bandwidth of either carrier. A composite spectrum emission mask is a combination of individual CC spectrum emissions masks. Where two masks overlap the most relaxed limit is used. Composite spectrum emission mask applies to frequencies up to  $\pm \Delta f_{\text{OoB}}$  starting from the edges of the sub-blocks. If for some frequency an individual CC spectrum emission mask overlaps with the bandwidth of another CC then the emission mask does not apply for that frequency.

### 6.5B.2.2.2 Additional spectrum emissions mask

When additional spectrum emission mask or masks apply, the additional SEM(s) shall be used to calculate the composite SEM described in 6.5B.2.2.1.

### 6.5B.2.2.3 Adjacent channel leakage ratio

For intra-band non-contiguous EN-DC, the EN-DC Adjacent Channel Leakage power Ratio ( $\text{EN-DC}_{\text{ACLR}}$ ) is the ratio of the sum of the filtered mean powers centred on the assigned E-UTRA and NR sub-block frequencies to the filtered mean power centred on an adjacent channel frequency at nominal channel spacing. In case the sub-block gap bandwidth  $W_{\text{gap}}$  is smaller than a E-UTRA or NR sub-block bandwidth, no  $\text{EN-DC}_{\text{ACLR}}$  requirement is set for the corresponding sub-block for the gap. The assigned EN-DC sub-block power and adjacent channel power are measured with rectangular filters with measurement bandwidths specified in TS 36.101 [4] for the E-UTRA sub-block, and TS 38.101-1 [2] for the NR sub-block. If the measured adjacent channel power is greater than  $-50\text{dBm}$  then the  $\text{EN-DC}_{\text{ACLR}}$  shall be higher than the value specified in for  $\text{E-UTRA}_{\text{ACLR}}$  and  $\text{NR}_{\text{ACLR}}$ .

## 6.5B.2.3 Inter-band EN-DC within FR1

Unless otherwise stated, the OoBE requirements specified in clause 6.6.2.1 of TS 36.101 [4], sub-clause 6.6.2 of TS 36.101 [4] and clause 6.5.2 of TS 38.101-1 [2] apply for each component carrier.

### 6.5B.2.3a Inter-band NE-DC within FR1

Unless otherwise stated, the OoBE requirements specified in clause 6.6.2.1 of TS 36.101 [4], sub-clause 6.6.2 of TS 36.101 [4] and clause 6.5.2 of TS 38.101-1 [2] apply for each component carrier.

## 6.5B.2.4 Inter-band EN-DC including FR2

Unless otherwise stated, out-of-band emissions requirement for E-UTRA single carrier and CA operation specified in clauses 6.6.2 of TS 36.101 [4] and for NR single carrier, CA operation and UL-MIMO specified in clause 6.5.2, 6.5A.2 and 6.5D.2 of TS 38.101-2 [3] apply.

## 6.5B.2.5 Inter-band EN-DC including both FR1 and FR2

Unless otherwise stated, out-of-band emissions requirement for E-UTRA single carrier and CA operation specified in clauses 6.6.2 of TS 36.101 [4] and for NR single carrier and CA operation specified in clause 6.5.2 and 6.5A.2 of TS 38.101-1 [2] and for NR single carrier, CA operation and UL-MIMO specified in clause 6.5.2, 6.5A.2 and 6.5D.2 of TS 38.101-2 [3] apply.

## 6.5B.3 Spurious emissions for DC

### 6.5B.3.1 Intra-band contiguous EN-DC

#### 6.5B.3.1.1 General spurious emissions

The general spurious emissions requirements specified in clause 6.6.3.1 of TS 36.101 [4] and clause 6.5.3.1 of TS 38.101-1 [2] apply beyond any frequencies for which the out-of-band emissions requirements in clause 6.5B.2.1 apply.

#### 6.5B.3.1.2 Spurious emission band UE co-existence

The requirements in Table 6.5B.3.1.2-1 apply on each component carrier with all component carriers are active.

**Table 6.5B.3.1.2-1: Requirements for intra-band contiguous EN-DC**

| EN-DC Configuration   | Spurious emission  |                       |   |                      |                     |           |      |
|---|--|-----------------------|---|----------------------|---------------------|-----------|------|
|   | Protected band   | Frequency range (MHz) |   |                      | Maximum Level (dBm) | MBW (MHz) | NOTE |
| DC_(n)71  | E-UTRA Band 4, 5, 12, 13, 14, 17, 24, 26, 30, 48, 66   | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |      |
|   | E-UTRA Band 2, 25, 41, 70  | 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         | 3    |
|   | E-UTRA Band 71   | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 3    |
| DC_(n)41  | E-UTRA Band 1, 2, 3, 4, 5, 8, 10, 11, 12, 13, 14, 17, 18, 19, 21, 24, 25, 26, 27, 28, 29, 30, 34, 39, 42, 44, 45, 48, 50, 51, 66, 70, 71, 73, 74<br>NR Band n77, n78 and n79 | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |      |
|   | Frequency range  | 1884.5                | - | 1915.7               | -41                 | 0.3       | 4    |
|   | NR Band n79  | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2    |
| NOTE 1: F <sub>DL_low</sub> and F <sub>DL_high</sub> refer to each frequency band specified in Table 5.5-1 in 3GPP TS 36.101 [4] or in Table 5.2-1 in 3GPP TS 38.101-1 [2].   |  |                       |   |                      |                     |           |      |
| NOTE 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.6.3.1-2 in 3GPP TS 36.101 [4] and Table 6.5.3.1-2 in 3GPP TS 38.101-1 [2] are permitted for each assigned carrier used in the measurement due to 2 <sup>nd</sup> , 3 <sup>rd</sup> , 4 <sup>th</sup> 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 MHz + N x L <sub>CRB</sub> x 180 kHz), where N is 2, 3, 4, 5 for the 2 <sup>nd</sup> , 3 <sup>rd</sup> , 4 <sup>th</sup> or 5 <sup>th</sup> harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval |  |                       |   |                      |                     |           |      |
| NOTE 3: These requirements also apply for the frequency ranges that are less than F <sub>OOB</sub> (MHz) in Table 6.6.3.1-1, Table 6.6.3.1A-1 in 3GPP TS 36.101 [4] or in Table 6.5.3.1-1 in 3GPP TS 38.101-1 [2] from the edge of the channel bandwidth.   |  |                       |   |                      |                     |           |      |
| NOTE 4: Applicable when co-existence with PHS system operating in 1884.5 - 1915.7 MHz.  |  |                       |   |                      |                     |           |      |

NOTE: To simplify the above Table, 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.

### 6.5B.3.2 Intra-band non-contiguous EN-DC

#### 6.5B.3.2.1 General spurious emissions

The general spurious emissions requirements specified in clause 6.6.3.1 of TS 36.101 [4] and clause 6.5.3.1 of TS 38.101-1 [2] apply beyond any frequencies for which the out-of-band emissions requirements in clause 6.5B.2.2 apply. If for some frequency an individual CC spurious emission requirement overlaps with the general spectrum emission mask or the bandwidth of another CC then it does not apply.

### 6.5B.3.2.2 Spurious emission band UE co-existence

The requirements in Table 6.5B.3.2.2-1 apply with all component carriers are active.

**Table 6.5B.3.2.2-1: Requirements for intra-band non-contiguous EN-DC**

| EN-DC Configuration   | Spurious emission   |                       |   |                |                     |           |
|---|---|-----------------------|---|----------------|---------------------|-----------|
|   | Protected band  | Frequency range (MHz) |   |                | Maximum Level (dBm) | MBW (MHz) |
| DC_41_n41   | E-UTRA Band 1, 2, 3, 4, 5, 8, 10, 11, 12, 13, 14, 17, 18, 19, 21, 24, 25, 26, 27, 28, 29, 34, 39, 42, 44, 45, 48, 50, 51, 66, 70, 71, 73, 74 NR Band n77, n78 and n79 | $F_{DL\_low}$         | - | $F_{DL\_high}$ | -50                 | 1         |
|   | Frequency range   | 1884.5                | - | 1915.7         | -41                 | 0.3       |
|   | E-UTRA Band 30  | $F_{DL\_low}$         | - | $F_{DL\_high}$ | -40                 | 1         |
| NOTE 1: $F_{DL\_low}$ and $F_{DL\_high}$ refer to each frequency band specified in Table 5.5-1 in 3GPP TS 36.101 [4] or in Table 5.2-1 in 3GPP TS 38.101-1 [2].   |   |                       |   |                |                     |           |
| NOTE 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.6.3.1-2 in 3GPP TS 36.101 [4] and Table 6.5.3.1-2 in 3GPP TS 38.101-1 [2] are permitted for each assigned carrier used in the measurement due to 2 <sup>nd</sup> , 3 <sup>rd</sup> , 4 <sup>th</sup> 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 $(2\text{MHz} + N \times L_{CRB} \times 180\text{kHz})$ , where N is 2, 3, 4, 5 for the 2 <sup>nd</sup> , 3 <sup>rd</sup> , 4 <sup>th</sup> or 5 <sup>th</sup> harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval |   |                       |   |                |                     |           |
| NOTE3: Applicable when co-existence with PHS system operating in 1884.5 - 1915.7 MHz.   |   |                       |   |                |                     |           |

NOTE: To simplify the above Table, 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.

### 6.5B.3.3 Inter-band EN-DC within FR1

#### 6.5B.3.3.1 General spurious emissions

The general spurious emissions requirements specified in clause 6.6.3.1 of TS 36.101 [4], clause 6.5.3.1 of TS 38.101-1 [2] and TS 38.101-2 [3] apply for each component carrier. For the case of inter-band EN-DC with a single carrier per cell group, the general spurious emissions requirements also apply with both downlink carrier and both both uplink carriers active. Limits on configured maximum output power for the uplink according to clause 6.2B.4 apply.

NOTE: The general spurious emission requirements with both uplink carriers active are allowed to be verified for only a single inter-band EN-DC configuration per NR band. Furthermore, the requirements are allowed to 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.

**Table 6.5B.3.3.1-1: (Void)**

#### 6.5B.3.3.2 Spurious emission band UE co-existence

This clause specifies the requirements for the specified EN-DC, for coexistence with protected bands. The requirements in Table 6.5B.3.3.2-1 apply on each component carrier with all component carriers are active.

NOTE: For inter-band EN-DC with uplink assigned to one LTE band and one NR band the requirements in Table 6.5B.3.3.2-1 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.

Table 6.5B.3.3.2-1: Requirements

| EN-DC Configuration                    | Spurious emission  |                       |      |                      |           |          |          |
|--|--|-----------------------|------|----------------------|-----------|----------|----------|
|  | Protected band   | Frequency range (MHz) |      | Maximum Level (dBm)  | MBW (MHz) | NOTE     |          |
| DC_1_n28                               | E-UTRA Band 5, 7, 8, 18, 19, 20, 26, 27, 31, 38, 40, 41, 72, 73<br>NR band n79   | F <sub>DL_low</sub>   | -    | F <sub>DL_high</sub> | -50       | 1        |          |
|  | E-UTRA Band 1, 22, 32, 42, 43, 50, 51, 52, 65, 74, 75, 76<br>NR band n77, n78  | F <sub>DL_low</sub>   | -    | F <sub>DL_high</sub> | -50       | 1        | 2        |
|  | E-UTRA band 3, 34  | F <sub>DL_low</sub>   | -    | F <sub>DL_high</sub> | -50       | 1        | 5        |
|  | E-UTRA Band 11, 21   | F <sub>DL_low</sub>   | -    | F <sub>DL_high</sub> | -50       | 1        | 9, 11    |
|  | E-UTRA Band 1, 65  | F <sub>DL_low</sub>   | -    | F <sub>DL_high</sub> | -50       | 1        | 9, 10    |
|  | Frequency range  | 470                   | -    | 694                  | -42       | 8        | 5, 17    |
|  | Frequency range  | 470                   | -    | 710                  | -26.2     | 6        | 14       |
|  | Frequency range  | 758                   | -    | 773                  | -32       | 1        | 5        |
|  | Frequency range  | 773                   | -    | 803                  | -50       | 1        |          |
|  | Frequency range  | 662                   | -    | 694                  | -26.2     | 6        | 5        |
|  | Frequency range  | 1880                  | -    | 1895                 | -40       | 1        | 5,16     |
|  | Frequency range  | 1895                  | -    | 1915                 | -15.5     | 5        | 5, 7, 16 |
| Frequency range                        | 1915   | -                     | 1920 | +1.6                 | 5         | 5, 7, 16 |          |
| DC_1_n40                               | Band 1, 5, 7, 8, 11, 18, 19, 20, 21, 22, 26, 27, 28, 31, 32, 38, 41, 42, 43, 44, 45, 50, 51, 52, 65, 67, 68, 69, 72, 73, 74, 75, 76<br>NR band n78 | F <sub>DL_low</sub>   | -    | F <sub>DL_high</sub> | -50       | 1        |          |
|  | Band 3, 34   | F <sub>DL_low</sub>   | -    | F <sub>DL_high</sub> | -50       | 1        | 5        |
|  | NR band n77, n79   | F <sub>DL_low</sub>   | -    | F <sub>DL_high</sub> | -50       | 1        | 2        |
|  | Frequency range  | 1880                  | -    | 1895                 | -40       | 1        | 5, 16    |
|  | Frequency range  | 1895                  | -    | 1915                 | -15.5     | 5        | 5, 7, 16 |
|  | Frequency range  | 1915                  | -    | 1920                 | +1.6      | 5        | 5, 7, 16 |
|  | Frequency range  | 1884.5                | -    | 1915.7               | -41       | 0.3      | 3        |
| DC_1_n51                               | E-UTRA Band 7, 12, 13, 17, 20, 22, 27, 28, 29, 31, 38, 44, 48, 67, 68, 69, 72, 73  | F <sub>DL_low</sub>   | -    | F <sub>DL_high</sub> | -50       | 1        |          |
|  | E-UTRA Band 3, 34  | F <sub>DL_low</sub>   | -    | F <sub>DL_high</sub> | -50       | 1        | 5, 2     |
|  | Frequency range  | 1880                  | -    | 1895                 | -40       | 1        | 5, 16    |
|  | Frequency range  | 1895                  | -    | 1915                 | -15.5     | 5        | 5, 7, 16 |
|  | Frequency range  | 1915                  | -    | 1920                 | +1.6      | 5        | 5, 7, 16 |
|  | E-UTRA Band 5, 6, 8, 26, 30, 40, 41, 42, 43, 46<br>NR Band n77, n78, n79,  | F <sub>DL_low</sub>   | -    | F <sub>DL_high</sub> | -50       | 1        | 2        |
| DC_1_n77                               | E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 20, 21, 26, 28, 34, 40, 41, 65, 74  | F <sub>DL_low</sub>   | -    | F <sub>DL_high</sub> | -50       | 1        |          |
|  | Frequency range  | 1880                  | -    | 1895                 | -40       | 1        | 5, 16    |
|  | Frequency range  | 1895                  | -    | 1915                 | -15.5     | 5        | 5, 7, 16 |
|  | Frequency range  | 1915                  | -    | 1920                 | +1.6      | 5        | 5, 7, 16 |
| DC_1_n78<br>DC_1_n84_ULS<br>UP-TDM_n78 | E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 20, 21, 26, 28, 34, 40, 41, 65, 74  | F <sub>DL_low</sub>   | -    | F <sub>DL_high</sub> | -50       | 1        |          |
|  | Frequency range  | 1880                  | -    | 1895                 | -40       | 1        | 5, 16    |
|  | Frequency range  | 1895                  | -    | 1915                 | -15.5     | 5        | 5, 7, 16 |
|  | Frequency range  | 1915                  | -    | 1920                 | +1.6      | 5        | 5, 7, 16 |
| DC_1_n79                               | E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 21, 26, 28, 34, 40, 41, 42, 65, 74  | F <sub>DL_low</sub>   | -    | F <sub>DL_high</sub> | -50       | 1        |          |
|  | Frequency range  | 1880                  | -    | 1895                 | -40       | 1        | 5, 16    |
|  | Frequency range  | 1895                  | -    | 1915                 | -15.5     | 5        | 5, 7, 16 |
|  | Frequency range  | 1915                  | -    | 1920                 | +1.6      | 5        | 5, 7, 16 |
| DC_2_n5                                | E-UTRA Band 4, 5, 12, 13, 14, 17, 24, 26, 28, 29, 30, 42, 50, 51, 66, 70, 71, 74, 85   | 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        | 2        |
|  | E-UTRA Band 41, 43, 48, 53   | F <sub>DL_low</sub>   | -    | F <sub>DL_high</sub> | -50       | 1        | 2        |
| DC_2_n66                               | E-UTRA Band 4, 5, 12, 13, 14, 17, 24, 26, 27, 28, 29, 30, 41, 50, 51, 66, 70, 71, 74, 85   | 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        | 5        |
|  | E-UTRA Band 42, 48   | F <sub>DL_low</sub>   | -    | F <sub>DL_high</sub> | -50       | 1        | 2        |
| DC_2_n71                               | E-UTRA Band 4, 5, 12, 13, 14, 17, 24, 26, 29, 30, 66   | F <sub>DL_low</sub>   | -    | F <sub>DL_high</sub> | -50       | 1        |          |
|  | E-UTRA Band 2, 25, 41, 48, 70  | F <sub>DL_low</sub>   | -    | F <sub>DL_high</sub> | -50       | 1        | 2        |
|  | E-UTRA Band 71   | F <sub>DL_low</sub>   | -    | F <sub>DL_high</sub> | -50       | 1        | 5        |

| EN-DC Configuration                     | Spurious emission  |                       |   |                      |                     |           |         |
|---|--|-----------------------|---|----------------------|---------------------|-----------|---------|
|   | Protected band   | Frequency range (MHz) |   |                      | Maximum Level (dBm) | MBW (MHz) | NOTE    |
| DC_2_n78                                | E-UTRA Band 4, 5, 12, 13, 14, 17, 24, 26, 27, 28, 29, 30, 41, 50, 51, 66, 70, 71, 74, 85   | 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         | 2       |
| DC_3_n7                                 | E-UTRA Band 1, 5, 7, 8, 20, 26, 27, 28, 31, 32, 33, 34, 40, 43, 44, 50, 51, 65, 67, 72, 74, 75, 76   | 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         | 5       |
|   | E-UTRA band 22, 42   | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2       |
|   | Frequency range  | 2570                  | - | 2575                 | +1.6                | 5         | 5, 6, 7 |
|   | Frequency range  | 2575                  | - | 2595                 | -15.5               | 5         | 5, 6, 7 |
|   | Frequency range  | 2595                  | - | 2620                 | -40                 | 1         | 5, 6    |
| DC_3_n28                                | E-UTRA Band 1, 42, 43, 50, 51, 65, 74, 75, 76<br>NR band n77, n78, n79   | 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         | 9, 11   |
|   | E-UTRA band 3  | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 5       |
|   | E-UTRA Band 5, 7, 8, 18, 19, 20, 26, 27, 31, 34, 38, 40, 41, 72  | 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         | 9, 10   |
|   | Frequency range  | 1884.5                | - | 1915.7               | -41                 | 0.3       | 13      |
|   | Frequency range  | 470                   | - | 710                  | -26.2               | 6         | 14      |
|   | Frequency range  | 758                   | - | 773                  | -32                 | 1         | 5       |
|   | Frequency range  | 773                   | - | 803                  | -50                 | 1         |         |
|   | Frequency range  | 1884.5                | - | 1915.7               | -41                 | 0.3       | 3, 9    |
| DC_3_n40                                | E-UTRA Band 1, 5, 7, 8, 11, 18, 19, 20, 21, 26, 27, 28, 31, 32, 33, 34, 38, 39, 41, 43, 44, 45, 50, 51, 65, 67, 68, 69, 72, 73, 74, 75, 76 | 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         | 5       |
|   | E-UTRA Band 22, 42, 52<br>NR band n77, n78, n79  | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2       |
|   | Frequency range  | 1884.5                | - | 1915.7               | -41                 | 0.3       | 3       |
| DC_3_n51                                | E-UTRA Band 7, 8, 12, 13, 17, 20, 27, 28, 31, 33, 38, 67, 68, 69, 72, 73   | 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         | 5       |
|   | E-UTRA Band 1, 5, 6, 22, 26, 30, 34, 36, 40, 41, 42, 43, 44, 46, 48, 65, 71  | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2       |
| DC_3_n77                                | E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 20, 21, 26, 28, 34, 39, 40, 41, 65, 74  | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |         |
|   | Frequency range  | 1884.5                | - | 1915.7               | -41                 | 0.3       | 3       |
| DC_3_n78<br>DC_3_n80_ULS<br>UP-TDM_n78, | E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 20, 21, 26, 28, 34, 39, 40, 41, 65, 74  | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |         |
|   | Frequency range  | 1884.5                | - | 1915.7               | -41                 | 0.3       | 3       |
| DC_3_n79<br>DC_3_n80_ULS<br>UP-TDM_n79, | E-UTRA Band 1, 3, 5, 8, 11, 18, 19, 21, 28, 34, 39, 40, 41, 65, 74   | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |         |
|   | E-UTRA Band 42   | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2       |
|   | Frequency range  | 1884.5                | - | 1915.7               | -41                 | 0.3       | 3       |
| DC_3_n82                                | E-UTRA Band 1, 3, 7, 8, 20, 31, 32, 33, 34, 40, 43, 50, 51, 65, 67, 68, 72, 74, 75, 76   | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |         |
|   | E-UTRA Band 22, 38, 42, 69   | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2       |
| DC_5_n40                                | E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 21, 28, 31, 34, 38, 42, 43, 45, 65, 73, 74  | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |         |
|   | E-UTRA Band 26   | 859                   | - | 869                  | -27                 | 1         |         |
|   | E-UTRA Band 41, 52<br>NR band n77, n78, n79  | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2       |
|   | Frequency range  | 1884.5                | - | 1915.7               | -41                 | 0.3       | 3       |
| DC_5_n66                                | E-UTRA Band 1, 2, 3, 4, 5, 6, 7, 8, 12, 13, 14, 17, 24, 25, 28, 29, 30, 34, 38, 40, 43, 45, 50, 51, 65, 66, 70, 71, 85                     | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |         |
|   | E-UTRA Band 26   | 859                   | - | 869                  | -27                 | 1         |         |
|   | E-UTRA Band 41, 42, 48, 52   | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2       |

| EN-DC Configuration                     | Spurious emission   |                       |   |                      |                     |           |         |
|---|---|-----------------------|---|----------------------|---------------------|-----------|---------|
|   | Protected band  | Frequency range (MHz) |   |                      | Maximum Level (dBm) | MBW (MHz) | NOTE    |
| DC_5_n78                                | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 12, 13, 14, 17, 24, 25, 28, 29, 30, 31, 34, 38, 40, 45, 65, 66, 70                         | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |         |
|   | E-UTRA Band 26  | 859                   | - | 869                  | -27                 | 1         |         |
|   | E-UTRA Band 41  | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 7, 2    |
| DC_7_n28                                | E-UTRA Band 2, 3, 5, 7, 8, 20, 26, 27, 31, 34, 40, 72   | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |         |
|   | E-UTRA Band 1, 4, 42, 43, 50, 51, 65, 66, 74, 75, 76<br>NR band n78   | 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         | 9, 10   |
|   | Frequency range   | 758                   | - | 773                  | -32                 | 1         | 5       |
|   | Frequency range   | 773                   | - | 803                  | -50                 | 1         |         |
|   | Frequency range   | 2570                  | - | 2575                 | +1.6                | 5         | 5, 6, 7 |
|   | Frequency range   | 2575                  | - | 2595                 | -15.5               | 5         | 5, 6, 7 |
|   | Frequency range   | 2595                  | - | 2620                 | -40                 | 1         | 5, 6    |
| DC_7_n51                                | E-UTRA Band 2, 3, 5, 8, 26, 30, 31, 32, 33, 34, 40, 48, 72  | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |         |
|   | Frequency range   | 2570                  | - | 2575                 | +1.6                | 5         | 5, 7, 6 |
|   | Frequency range   | 2575                  | - | 2595                 | -15.5               | 5         | 5, 7, 6 |
|   | Frequency range   | 2595                  | - | 2620                 | -40                 | 1         | 5       |
|   | E-UTRA Band 1, 4, 12, 13, 14, 17, 20, 22, 23, 27, 28, 29, 42, 43, 44, 46, 65, 66, 67, 68<br>NR Band n77, n78, n79,          | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2       |
| DC_7_n78                                | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 11, 18, 19, 20, 21, 26, 27, 28, 31, 32, 33, 34, 40, 50, 51, 65, 66, 67, 68, 72, 74, 75, 76 | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |         |
|   | Frequency range   | 2570                  | - | 2575                 | +1.6                | 5         | 5, 6, 7 |
|   | Frequency range   | 2575                  | - | 2595                 | -15.5               | 5         | 5, 6, 7 |
|   | Frequency range   | 2595                  | - | 2620                 | -40                 | 1         | 5, 6    |
| DC_8_n40                                | E-UTRA Band 1, 5, 11, 18, 19, 20, 21, 26, 28, 31, 32, 33, 34, 38, 39,, 45, 50, 51, 65, 67, 68, 69, 72, 73, 74, 75, 76       | 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 Band 8   | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 5       |
|   | Frequency range   | 1884.5                | - | 1915.7               | -41                 | 0.3       | 3       |
| DC_8_n77                                | E-UTRA Band 1, 20, 28, 31, 32, 33, 34, 38, 39, 40, 44, 45, 50, 51, 65, 67, 68, 69, 72, 73, 74, 75, 76                       | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |         |
|   | E-UTRA band 3, 7, 41  | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2       |
|   | E-UTRA Band 8   | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 5       |
|   | E-UTRA Band 11, 21  | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 12      |
|   | Frequency range   | 860                   | - | 890                  | -40                 | 1         | 5, 12   |
|   | Frequency range   | 1884.5                | - | 1915.7               | -41                 | 0.3       | 3, 12   |
| DC_8_n78<br>DC_8_n81_ULS<br>UP-TDM_n78, | E-UTRA Band 1, 20, 28, 34, 39, 40, 65, 74   | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |         |
|   | E-UTRA Band 3, 7, 41  | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2       |
|   | E-UTRA Band 8   | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 5       |
|   | E-UTRA Band 11, 21  | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 12      |
|   | Frequency range   | 860                   | - | 890                  | -40                 | 1         | 5, 12   |
|   | Frequency range   | 1884.5                | - | 1915.7               | -41                 | 0.3       | 3, 12   |
| DC_8_n79<br>DC_8_n81_ULS<br>UP-TDM_n79, | E-UTRA Band 1, 8, 28, 34, 39, 40, 65, 74  | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |         |
|   | E-UTRA Band 3,41,42   | 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         | 12      |
|   | Frequency range   | 860                   | - | 890                  | -40                 | 1         | 5, 12   |
|   | Frequency range   | 1884.5                | - | 1915.7               | -41                 | 0.3       | 3       |
| DC_11_n77                               | E-UTRA Band 1, 3, 11, 18, 19, 21, 28, 34, 40, 65  | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |         |
|   | 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         |         |

| EN-DC Configuration | Spurious emission  |                       |   |                      |                     |           |      |
|---------------------|--|-----------------------|---|----------------------|---------------------|-----------|------|
|                     | Protected band   | Frequency range (MHz) |   |                      | Maximum Level (dBm) | MBW (MHz) | NOTE |
| DC_11_n78           | E-UTRA Band 1, 3, 11, 18, 19, 21, 28, 34, 40, 65                       | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |      |
|                     | 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         |      |
| DC_11_n79           | E-UTRA Band 1, 3, 11, 18, 19, 21, 28, 34, 40, 42, 65                   | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |      |
|                     | 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         |      |
| DC_12_n5            | E-UTRA Band 2, 5, 13, 14, 17, 24, 25, 26, 30, 43, 71, 74               | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |      |
|                     | E-UTRA Bands 4, 41, 42, 48, 50, 51, 66, 70                             | 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         |      |
| DC_12_n66           | E-UTRA Band 2, 5, 13, 14, 17, 25, 26, 27, 30, 41, 53, 71, 74           | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |      |
|                     | E-UTRA Band 4, 48, 50, 51, 66, 70                                      | 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         | 5    |
| DC_18_n77           | E-UTRA Band 1, 3, 11, 21, 28, 34, 40, 65, 74                           | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |      |
|                     | 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         |      |
| DC_18_n78           | E-UTRA Band 1, 3, 11, 21, 28, 34, 40, 65, 74                           | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |      |
|                     | 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         |      |
| DC_18_n79           | E-UTRA Band 1, 3, 11, 21, 28, 34, 40, 42, 65, 74                       | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |      |
|                     | 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         |      |
| DC_19_n77           | E-UTRA Band 1, 3, 11, 21, 28, 34, 40, 65, 74                           | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |      |
|                     | 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         |      |
| DC_19_n78           | E-UTRA Band 1, 3, 11, 21, 28, 34, 40, 65, 74                           | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |      |
|                     | 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         |      |
| DC_19_n79           | E-UTRA Band 1, 3, 11, 21, 28, 34, 40, 42, 65, 74                       | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |      |
|                     | 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         |      |
| DC_20_n8            | E-UTRA Band 1, 28, 31, 32, 34, 65, 75, 76                              | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |      |
|                     | E-UTRA Band 3, 7, 22, 38, 42, 43 NR Band n78                           | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2    |
| DC_20_n28           | E-UTRA Band 3, 7, 8, 31, 34  | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |      |
| DC_20_n83           | E-UTRA Band 1, 22, 32, 38, 42, 43, 65, 75, 76, NR Band n78             | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2    |
| DC_20_n51           | E-UTRA Band 1, 3, 4, 8, 17, 22, 28, 29, 31, 40, 43, 48, 65, 66, 68, 72 | 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         | 5    |
|                     | Frequency range  | 758                   | - | 788                  | -50                 | 1         |      |



| EN-DC Configuration                  | Spurious emission   |                       |   |                      |                     |           |      |
|--------------------------------------|---|-----------------------|---|----------------------|---------------------|-----------|------|
|                                      | Protected band  | Frequency range (MHz) |   |                      | Maximum Level (dBm) | MBW (MHz) | NOTE |
|                                      | E-UTRA Band 2, 7, 25, 32, 33, 34, 35, 36, 37, 38, 39, 41, 42, 46, 69, 70 NR Band n77, n78, n79,                                   | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2    |
| DC_20_n77                            | E-UTRA Band 1, 3, 7, 8, 31, 32, 33, 34, 40, 50, 51, 65, 67, 68, 72, 74, 75, 76  | 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         | 5    |
|                                      | E-UTRA Band 38, 69  | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2    |
| DC_20_n78, DC_20_n82_ULS UP-TDM_n78, | E-UTRA Band 1, 3, 7, 8, 31, 32, 33, 34, 40, 50, 51, 65, 67, 68, 72, 74, 75, 76  | 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         | 5    |
|                                      | E-UTRA Band 38, 69  | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2    |
| DC_21_n77                            | E-UTRA Band 1, 3, 18, 19, 21, 28, 34, 40, 65  | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |      |
|                                      | 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         |      |
| DC_21_n78                            | E-UTRA Band 1, 3, 18, 19, 21, 28, 34, 40, 65  | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |      |
|                                      | 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         |      |
| DC_21_n79                            | E-UTRA Band 1, 3, 18, 19, 21, 28, 34, 40, 42, 65  | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |      |
|                                      | 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         |      |
| DC_25_n41                            | E-UTRA Band 4, 5, 12, 13, 14, 17, 24, 26, 27, 28, 29, 30, 42, 45, 66, 70, 71  | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |      |
|                                      | E-UTRA Band 48  | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2    |
|                                      | E-UTRA/NR Band 2, 25  | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 5    |
| DC_26_n41                            | E-UTRA Band 1, 2, 3, 4, 5, 11, 12, 13, 14, 17, 18, 19, 21, 24, 25, 26, 29, 30, 31, 34, 39, 42, 43, 48, 50, 51, 65, 66, 70, 71, 74 | 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 n77, n78, n79   | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2    |
|                                      | Frequency range   | 1884.5                | - | 1915.7               | -41                 | 0.3       | 3    |
|                                      | Frequency range   | 703                   | - | 799                  | -50                 | 1         |      |
|                                      | Frequency range   | 799                   | - | 803                  | -40                 | 1         | 5    |
|                                      | Frequency range   | 945                   | - | 960                  | -50                 | 1         |      |
| DC_26_n77                            | E-UTRA Band 1, 3, 5, 11, 18, 19, 21, 26, 34, 39, 40, 65, 74   | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |      |
|                                      | E-UTRA Band 41  | 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         | 5    |
|                                      | 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         |      |
| DC_26_n78                            | E-UTRA Band 1, 3, 5, 11, 18, 19, 21, 26, 34, 39, 40, 65, 74   | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |      |
|                                      | E-UTRA Band 41  | 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         | 5    |
|                                      | 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         |      |
| DC_26_n79                            | E-UTRA Band 1, 3, 5, 11, 18, 19, 21, 26, 34, 39, 40, 42, 65, 74   | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |      |
|                                      | E-UTRA Band 41  | 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         | 5    |

| EN-DC Configuration                       | Spurious emission  |  |                     |                      |                      |      |          |
|---|--|--|---------------------|----------------------|----------------------|------|----------|
|   | Protected band   | Frequency range (MHz)                    |                     | Maximum Level (dBm)  | MBW (MHz)            | NOTE |          |
|   | 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    |          |
| DC_28_n51                                 | E-UTRA Band 2, 3, 5, 7, 8, 25, 26, 31, 34, 38, 40, 41, 72                          | F <sub>DL_low</sub>                      | -                   | F <sub>DL_high</sub> | -50                  | 1    |          |
|   | E-UTRA Band 4, 20, 22, 24, 32, 42, 43, 45, 46, 65, 66, 71, 73<br>NR band n78, n79  | 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    | 2, 9, 10 |
|   | Frequency range  | 470                                      | -                   | 694                  | -42                  | 8    | 5, 17    |
|   | Frequency range  | 470                                      | -                   | 710                  | -26.2                | 6    | 14       |
|   | Frequency range  | 662                                      | -                   | 694                  | -26.2                | 6    | 5        |
|   | Frequency range  | 758                                      | -                   | 773                  | -32                  | 1    | 5        |
|   | Frequency range  | 773                                      | -                   | 803                  | -50                  | 1    |          |
| DC_28_n77                                 | E-UTRA Band 3, 5, 7, 8, 18, 19, 20, 26, 34, 39, 40, 41                             | F <sub>DL_low</sub>                      | -                   | F <sub>DL_high</sub> | -50                  | 1    |          |
|   | E-UTRA Band 1, 65, 74  | 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    | 9, 11    |
|   | E-UTRA Band 11, 21   | F <sub>DL_low</sub>                      | -                   | F <sub>DL_high</sub> | -50                  | 1    | 9, 10    |
|   | Frequency range  | 758                                      | -                   | 773                  | -32                  | 1    |          |
|   | Frequency range  | 773                                      | -                   | 803                  | -50                  | 1    |          |
| DC_28_n78<br>DC_28_n83_ULS<br>UP-TDM_n78, | E-UTRA Band 3, 5, 7, 8, 18, 19, 20, 26, 34, 39, 40, 41                             | F <sub>DL_low</sub>                      | -                   | F <sub>DL_high</sub> | -50                  | 1    |          |
|   | E-UTRA Band 1, 65, 74  | 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    | 9, 11    |
|   | E-UTRA Band 11, 21   | F <sub>DL_low</sub>                      | -                   | F <sub>DL_high</sub> | -50                  | 1    | 9, 10    |
|   | Frequency range  | 758                                      | -                   | 773                  | -32                  | 1    |          |
|   | Frequency range  | 773                                      | -                   | 803                  | -50                  | 1    |          |
| DC_28_n79                                 | E-UTRA Band 3, 5, 8, 18, 19, 34, 39, 40, 41  | F <sub>DL_low</sub>                      | -                   | F <sub>DL_high</sub> | -50                  | 1    |          |
|   | E-UTRA Band 1, 42, 65, 74  | 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    | 9, 11    |
|   | E-UTRA Band 11, 21   | F <sub>DL_low</sub>                      | -                   | F <sub>DL_high</sub> | -50                  | 1    | 9, 10    |
|   | Frequency range  | 758                                      | -                   | 773                  | -32                  | 1    |          |
|   | Frequency range  | 773                                      | -                   | 803                  | -50                  | 1    |          |
| DC_30_n5                                  | E-UTRA Band 2, 4, 5, 7, 12, 13, 14, 17, 24, 25, 26, 29, 30, 38, 48, 66, 70, 71, 85 | F <sub>DL_low</sub>                      | -                   | F <sub>DL_high</sub> | -50                  | 1    |          |
|   | E-UTRA Band 41, 53,  | F <sub>DL_low</sub>                      | -                   | F <sub>DL_high</sub> | -50                  | 1    | 2        |
|   | E-UTRA Band 2, 4, 5, 12, 13, 14, 17, 24, 25, 26, 27, 29, 30, 38, 41, 66, 70, 71    | F <sub>DL_low</sub>                      | -                   | F <sub>DL_high</sub> | -50                  | 1    |          |
|   | E-UTRA Band 48   | F <sub>DL_low</sub>                      | -                   | F <sub>DL_high</sub> | -50                  | 1    | 2        |
|   | DC_38_n78  | N/A                                      |                     |                      |                      |      |          |
|   | DC_39_n78  | E-UTRA Band 1, 8, 28, 34, 40, 41, 44, 45 | F <sub>DL_low</sub> | -                    | F <sub>DL_high</sub> | -50  | 1        |
| Frequency range                           |  | 1805                                     | -                   | 1855                 | -40                  | 1    | 18       |
| Frequency range                           |  | 1855                                     | -                   | 1880                 | -15.5                | 5    | 18       |
| DC_39_n79                                 | E-UTRA Band 1, 8, 28, 34, 40, 41, 44, 45   | F <sub>DL_low</sub>                      | -                   | F <sub>DL_high</sub> | -50                  | 1    |          |
|   | Frequency range  | 1805                                     | -                   | 1855                 | -40                  | 1    | 18       |
|   | Frequency range  | 1855                                     | -                   | 1880                 | -15.5                | 5    | 18       |
| DC_40_n77                                 | N/A  |  |                     |                      |                      |      |          |
| DC_41_n77                                 | E-UTRA Band 1, 3, 5, 8, 11, 18, 19, 21, 26, 28, 33, 34, 39, 40, 44, 45, 73, 74     | F <sub>DL_low</sub>                      | -                   | F <sub>DL_high</sub> | -50                  | 1    |          |
|   | Frequency range  | 1884.5                                   | -                   | 1915.7               | -41                  | 0.3  | 3        |
| DC_41_n78                                 | E-UTRA Band 1, 3, 5, 8, 11, 18, 19, 21, 26, 28, 34, 39, 40, 44, 45, 74             | F <sub>DL_low</sub>                      | -                   | F <sub>DL_high</sub> | -50                  | 1    |          |
|   | Frequency range  | 1884.5                                   | -                   | 1915.7               | -41                  | 0.3  | 3        |
| DC_41_n79                                 | E-UTRA Band 1, 3, 5, 8, 11, 18, 19, 21, 26, 28, 34, 40, 42, 44, 45, 65, 74         | F <sub>DL_low</sub>                      | -                   | F <sub>DL_high</sub> | -50                  | 1    |          |
|   | Frequency range  | 1884.5                                   | -                   | 1915.7               | -41                  | 0.3  | 3        |
| DC_42_n51                                 | E-UTRA Band 3, 8, 20, 25, 30, 31, 34, 39, 41, 73                                   | F <sub>DL_low</sub>                      | -                   | F <sub>DL_high</sub> | -50                  | 1    |          |

| EN-DC Configuration                  | Spurious emission  |                       |   |                      |                     |           |      |
|--------------------------------------|--|-----------------------|---|----------------------|---------------------|-----------|------|
|                                      | Protected band   | Frequency range (MHz) |   |                      | Maximum Level (dBm) | MBW (MHz) | NOTE |
|                                      | E-UTRA Band 1, 2, 4, 5, 6, 7, 12, 13, 14, 17, 23, 24, 26, 27, 28, 29, 32, 38, 40, 44, 46, 65, 66, 67, 68, 70, 71           | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2    |
| DC_42_n77                            | N/A  |                       |   |                      |                     |           |      |
| DC_42_n78                            | N/A  |                       |   |                      |                     |           |      |
| DC_42_n79                            | N/A  |                       |   |                      |                     |           |      |
| DC_66_n5                             | E-UTRA Band 1, 2, 3, 4, 5, 6, 7, 8, 12, 13, 14, 17, 24, 25, 26, 28, 29, 30, 34, 38, 40, 43, 45, 50, 51, 65, 66, 70, 71, 85 | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |      |
|                                      | E-UTRA Band 41, 42, 48, 52   | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2    |
| DC_66_n71                            | E-UTRA Band 4, 5, 13, 14, 17, 24, 26, 27, 29, 30, 43-50, 51, 66, 74  | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         |      |
|                                      | E-UTRA Band 2, 7, 22, 25, 41, 42, 48, 70   | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 2    |
|                                      | E-UTRA Band 71   | F <sub>DL_low</sub>   | - | F <sub>DL_high</sub> | -50                 | 1         | 5    |
| DC_66_n78, DC_66_n86_ULS UP-TDM_n78, | E-UTRA Band 1, 3, 5, 7, 8, 20, 26, 28, 34, 39, 40, 41, 65  | 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 5.5-1 in 3GPP TS 36.101 [4] or in Table 5.2-1 in 3GPP TS 38.101-1 [2].

NOTE 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.6.3.1-2 in 3GPP TS 36.101 [4] and Table 6.5.3.1-2 in 3GPP TS 38.101-1 [2] are permitted for each assigned carrier used in the measurement due to 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> 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 MHz + N x L<sub>CRB</sub> x 180 kHz), where N is 2, 3, 4, 5 for the 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> or 5<sup>th</sup> 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: Void

NOTE 5: These requirements also apply for the frequency ranges that are less than F<sub>OOB</sub> (MHz) in Table 6.6.3.1-1, Table 6.6.3.1A-1 in 3GPP TS 36.101 [4] or in Table 6.5.3.1-1 in 3GPP TS 38.101-1 [2] from the edge of the channel bandwidth.

NOTE 6: This requirement is applicable for any channel bandwidths 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.

NOTE 7: For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band.

NOTE 8: Void

NOTE 9: Applicable when the assigned E-UTRA or NR carrier is confined within 718 MHz and 748 MHz and when the channel bandwidth used is 5 or 10 MHz.

NOTE 10: As exceptions, measurements with a level up to the applicable requirement of -38 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 2<sup>nd</sup> 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 2<sup>nd</sup> harmonic totally or partially overlaps the measurement bandwidth (MBW).

NOTE 11: 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 3<sup>rd</sup> 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 3<sup>rd</sup> harmonic totally or partially overlaps the measurement bandwidth (MBW).

NOTE 12: This requirement is applicable only for the following cases: A: for carriers of 5 MHz channel bandwidth when carrier centre frequency (Fc) is within the range 902.5 MHz ≤ Fc < 907.5 MHz with an uplink transmission bandwidth less than or equal to 20 RB; B: for carriers of 5 MHz channel bandwidth when carrier centre frequency (Fc) is within the range 907.5 MHz ≤ Fc ≤ 912.5 MHz without any restriction on uplink transmission bandwidth; C: for carriers of 10 MHz channel bandwidth when carrier centre frequency (Fc) is Fc = 910 MHz with an uplink transmission bandwidth less than or equal to 32 RB with RB<sub>start</sub> > 3.

NOTE 13: Void

NOTE 14: This requirement is applicable for 5 and 10 MHz E-UTRA or NR channel bandwidth allocated within 718-728MHz. For carriers of 10 MHz bandwidth, this requirement applies for an uplink transmission bandwidth less than or equal to 30 RB with RB<sub>start</sub> > 1 and RB<sub>start</sub> < 48.

NOTE 15: Void

NOTE 16: This requirement is applicable for any channel bandwidths within the range 1920 - 1980 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range

| EN-DC Configuration | Spurious emission   |                       |                     |           |      |
|---------------------|---|-----------------------|---------------------|-----------|------|
|                     | Protected band  | Frequency range (MHz) | Maximum Level (dBm) | MBW (MHz) | NOTE |
|                     | 1927.5 - 1929.5 MHz and for carriers of 20 MHz bandwidth when 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.   |                       |                     |           |      |
|                     | NOTE 17: This requirement is applicable in the case of a 10 MHz E-UTRA or NR carrier confined within 703 MHz and 733 MHz, otherwise the requirement of -25 dBm with a measurement bandwidth of 8 MHz applies.   |                       |                     |           |      |
|                     | NOTE 18: This requirement is only applicable for E-UTRA 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 E-UTRA carriers of 15 MHz bandwidth when carrier center frequency is within the range 1892.5 - 1894.5 MHz and for E-UTRA carriers of 20 MHz bandwidth when carrier center frequency is within the range 1895 - 1903 MHz. |                       |                     |           |      |
|                     | NOTE 19: Void   |                       |                     |           |      |

NOTE: To simplify the above Table, 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.

### 6.5B.3.3a Inter-band NE-DC within FR1

#### 6.5B.3.3a.1 General spurious emissions

The general spurious emissions requirements specified in clause 6.6.3.1 of TS 36.101 [4], clause 6.5.3.1 of TS 38.101-1 [2] and TS 38.101-2 [3] apply for each component carrier.

#### 6.5B.3.3a.2 Spurious emission band UE co-existence

This clause specifies the requirements for the specified NE-DC configurations that do not have a corresponding defined EN-DC, for coexistence with protected bands. For the NE-DC configurations that have a corresponding specified EN-DC configuration, the requirements in Table 6.5B.3.3.2-1 apply on each component carrier with all component carriers are active.

### 6.5B.3.4 Inter-band EN-DC including FR2

General spurious requirement for E-UTRA single carrier and CA operation specified in clauses 6.6.3.1 and 6.6.3.1A of TS 36.101 [4] and for NR single carrier, CA operation and UL-MIMO specified in clause 6.5.3, 6.5A.3 and 6.5D.3 of TS 38.101-2 [3] apply.

#### 6.5B.3.4.1 Spurious emission band UE co-existence

This clause specifies the requirements for the specified EN-DC, for coexistence with protected bands. Unless otherwise stated, for inter-band EN-DC configurations defined in table 5.5B.5.1-1, no requirements for FR2 NR bands to protect E-UTRA and FR1 NR bands are applied to the constituent FR2 NR bands. Spurious emission band UE co-existence requirements specified in TS 36.101 [4] are applied to the constituent E-UTRA bands for the EN-DC configuration.

Spurious emission band UE co-existence requirement for E-UTRA single carrier and CA operation specified in clauses 6.6.3.2 and 6.6.3.2A of TS 36.101 [4] and for NR single carrier, CA operation and UL-MIMO specified in clause 6.5.3.1, 6.5A.3.1 and 6.5D.3.1 of TS 38.101-2 [3] apply.

**Table 6.5B.3.4.1-1: Void**

### 6.5B.3.5 Inter-band EN-DC including both FR1 and FR2

General spurious requirement for E-UTRA single carrier and CA operation specified in clauses 6.6.3.1 and 6.6.3.1A of TS 36.101 [4] and for NR single carrier and CA operation specified in clause 6.5.3.1 and 6.5A.3.1 of TS 38.101-1 [2] and for NR single carrier, CA operation and UL-MIMO specified in clause 6.5.3, 6.5A.3 and 6.5D.3 of TS 38.101-2 [3] apply.

### 6.5B.3.5.1 Spurious emission band UE co-existence

This clause specifies the requirements for the specified EN-DC, for coexistence with protected bands. Unless otherwise stated, for inter-band EN-DC configurations defined in clause 5.5B.6, no requirements for FR2 NR bands to protect E-UTRA and FR1 NR bands are applied to the constituent FR2 NR bands. Spurious emission band UE co-existence requirements for constituent E-UTRA and FR1 NR bands for the inter-band EN-DC are the same as those for the corresponding EN-DC configuration without the FR2 bands specified in 6.5B.3.2.2.

Spurious emission band UE co-existence requirement for E-UTRA single carrier and CA operation specified in clauses 6.6.3.2 and 6.6.3.2A of TS 36.101 [4] and for NR single carrier and CA operation specified in clause 6.5.3.2 and 6.5A.3.2 of TS 38.101-1 [2] and for NR single carrier, CA operation and UL-MIMO specified in clause 6.5.3.1, 6.5A.3.1 and 6.5D.3.1 of TS 38.101-2 [3] apply.

**Table 6.5B.3.5.1-1: Void**

## 6.5B.4 Additional spurious emissions

### 6.5B.4.1 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.

**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.

#### 6.5B.4.1.1 Void

### 6.5B.4.2 Intra-band contiguous EN-DC

#### 6.5B.4.2.1 Minimum requirement (network signalled 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 6.5B.4.1.1-1. This requirement also applies for the frequency ranges that are less than  $F_{\text{OOB}}$  (MHz) in Table 6.6.3.1-1 from the edge of the channel bandwidth.

**Table 6.5B.4.1.1-1: Additional requirements**

| Frequency band (MHz)   | Channel bandwidth / Spectrum emission limit (dBm) | Measurement bandwidth   |
|------------------------|---|---|
| $2495 \leq f < 2496$   | -13   | 1 % of Channel BW for contiguous BW up to 100 MHz,<br>1 MHz for contiguous BW > 100 MHz |
| $2490.5 \leq f < 2495$ | -13   | 1 MHz   |
| $0 < f < 2490.5$       | -25   | 1 MHz   |

### 6.5B.4.3 Intra-band non-contiguous EN-DC

#### 6.5B.4.3.1 Minimum requirement (network signalled 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 6.5B.4.1.1-1. This requirement also applies for the frequency ranges that are less than  $F_{\text{OOB}}$  (MHz) in Table 6.6.3.1-1 from the edge of the channel bandwidth.

**Table 6.5B.4.1.1-1: Additional requirements**

| Frequency band (MHz)   | Channel bandwidth / Spectrum emission limit (dBm) | Measurement bandwidth   |
|------------------------|---|---|
| $2495 \leq f < 2496$   | -13   | 1 % of Channel BW for contiguous BW up to 100 MHz,<br>1 MHz for contiguous BW > 100 MHz |
| $2490.5 \leq f < 2495$ | -13   | 1 MHz   |
| $0 < f < 2490.5$       | -25   | 1 MHz   |

#### 6.5B.4.4 Inter-band EN-DC within FR1

The additional spurious emissions requirements specified for E-UTRA in clause 6.6.3.3 and 6.6.3.3A of TS 36.101 [4] and for NR single carrier, CA operation and UL-MIMO specified in clause 6.5.3.3, 6.5A.3.3 and 6.5D.3 of TS 38.101-1 [2] apply for each component carrier.

#### 6.5B.4.4a Inter-band NE-DC within FR1

The additional spurious emissions requirements specified for E-UTRA in clause 6.6.3.3 and 6.6.3.3A of TS 36.101 [4] and for NR single carrier, CA operation and UL-MIMO specified in clause 6.5.3.3, 6.5A.3.3 and 6.5D.3 of TS 38.101-1 [2] apply for each component carrier.

#### 6.5B.4.5 Inter-band EN-DC including FR2

The additional spurious emissions requirements specified for E-UTRA in clause 6.6.3.3 and 6.6.3.3A of TS 36.101 [4] and for NR single carrier, CA operation and UL-MIMO specified in clause 6.5.3.3, 6.5A.3.3 and 6.5D.3 of TS 38.101-2 [3] apply for each component carrier.

#### 6.5B.4.6 Inter-band EN-DC including both FR1 and FR2

The additional spurious emissions requirements specified for E-UTRA in clause 6.6.3.3 and 6.6.3.3A of TS 36.101 [4] and for NR single carrier, CA operation and UL-MIMO specified in clause 6.5.3.3, 6.5A.3.3 and 6.5D.3 of TS 38.101-1 [2] and in clause 6.5.3.3, 6.5A.3.3 and 6.5D.3 of TS 38.101-2 [3] apply for each component carrier.

### 6.5B.5 Transmit intermodulation for DC

#### 6.5B.5.1 Intra-band contiguous EN-DC

Unless otherwise stated, no transmit intermodulation requirements are applied for intra-band contiguous EN-DC.

#### 6.5B.5.2 Intra-band non-contiguous EN-DC

Unless otherwise stated, no transmit intermodulation requirements are applied for intra band non-contiguous EN DC.

#### 6.5B.5.3 Inter-band EN-DC within FR1

The transmit intermodulation requirement specified in clauses 6.7.1 of TS 36.101 [4] and clauses 6.5.4 and 6.5A.4 of TS 38.101-1 [2] apply for each component carrier in E-UTRA bands and NR bands, respectively.

#### 6.5B.5.3a Inter-band NE-DC within FR1

The transmit intermodulation requirement specified in clauses 6.7.1 and 6.7.1A of TS 36.101 [4] and clauses 6.5.4 and 6.5A.4 of TS 38.101-1 [2] apply for each component carrier in E-UTRA bands and NR bands, respectively.

#### 6.5B.5.4 Inter-band EN-DC including FR2

Transmit intermodulation requirements specified in clause 6.7.1 and 6.7.1A of TS 36.101 [4] apply for each component carrier in E-UTRA bands.

#### 6.5B.5.5 Inter-band EN-DC including both FR1 and FR2

Transmit intermodulation requirement specified in clauses 6.7.1 and 6.7.1A of TS 36.101 [4] and clauses 6.5.4 and 6.5A.4 of TS 38.101-1 [2] apply for each component carrier in E-UTRA bands and NR bands, respectively.

### 6.6B Beam correspondence for DC

#### 6.6B.1 Void

#### 6.6B.2 Void

#### 6.6B.3 Void

#### 6.6B.4 Inter-band EN-DC including FR2

Beam correspondence requirement specified in clause 6.6 and 6.6A of TS 38.101-2 [3] apply for NR FR2 bands.

#### 6.6B.5 Inter-band EN-DC including both FR1 and FR2

Beam correspondence requirement specified in clause 6.6 and 6.6A of TS 38.101-2 [3] apply for NR FR2 bands.

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## 7 Receiver characteristics

### 7.1 General

Unless otherwise stated the receiver characteristics are specified at the antenna connector(s) of the UE for the bands operating on frequency range 1 and over the air of the UE for the bands operating on frequency range 2. The requirements for frequency range 1 and frequency range 2 can be verified separately. For the carrier in frequency range 1, requirements can be verified with NR FR2 link disabled. For the carrier in frequency range 2, requirements can be verified in OTA mode with E-UTRA connecting to the network by OTA without calibration.

The requirements defined in this clause are the extra requirements compared with the single carrier requirements defined in TS 38.101-1 [2] and TS 38.101-2 [3].

Unless otherwise stated, the UL and DL reference measurement channels are the same with the configurations specified in TS 38.101-1 [2] and TS 38.101-2 [3].

Unless otherwise stated, requirements for NR receiver written in TS 38.101-1 [2] and TS 38.101-2 [3] apply and are assumed anchor agnostic. Requirements are verified under conditions where anchor resources do not interfere NR operation.

For intra-band EN-DC, the output power is configured as follows:

- One E-UTRA uplink carrier with the output power set to 29 dB below  $P_{\text{CMAX\_L,c}}$  and the NR band whose downlink is being tested has its uplink carrier output power set to 4 dB below  $P_{\text{CMAX\_L,f,c}}$ .
- One NR uplink carrier with the output power set to 29 dB Below  $P_{\text{CMAX\_L,f,c}}$  and the E-UTRA band whose downlink is being tested has its uplink carrier output power set to 4 dB below  $P_{\text{CMAX\_L,c}}$ .

For the additional requirements for intra-band non-contiguous EN-DC of two 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 EN-DC of two 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 EN-DC of two 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 the E-UTRA or NR sub-blocks, so that the interferer frequency position does not change the nature of the core requirement tested:

$$W_{\text{gap}} \geq 2 \cdot |F_{\text{Interferer (offset)}}| - BW_{\text{Channel}}$$

For the E-UTRA sub-block, the  $F_{\text{Interferer (offset)}}$ , for a sub-block with a single component carrier is the interferer frequency offset with respect to carrier as specified in clause 7.5.1, clause 7.6.1 and clause 7.6.3 for the respective requirement in TS 36.101 [4] and  $BW_{\text{Channel}}$ .  $F_{\text{Interferer (offset)}}$  for the E-UTRA 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 7.5.1A, 7.6.1A and 7.6.3A in TS 36.101 [4].

For the NR sub-block, the  $F_{\text{Interferer (offset)}}$ , for a sub-block with a single component carrier is the interferer frequency offset with respect to carrier as specified in clause 7.5.1, clause 7.6.1 and clause 7.6.3 for the respective requirement in TS 38.101-1 [2] and  $BW_{\text{Channel}}$ .

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 requirements of FR1 in this clause, the UE shall be verified with four or eight Rx antenna ports and skip two Rx antenna ports requirements in operating bands where the UE is equipped with four or eight Rx antenna ports, otherwise, the UE shall be verified with two Rx antenna ports.

## 7.2 Void

## 7.3 Void

## 7.3A Reference sensitivity for CA

### 7.3A.1 General

For NR CA operation NR single carrier REFSENS requirements defined in TS 38.101-1 [2] and TS 38.101-2 [3] apply to all downlink bands part of NR CA configurations listed in Table 5.2A.1-1 unless sensitivity degradation is allowed as defined in clause 7.3A.

### 7.3A.2 Reference sensitivity power level for CA

### 7.3A.3 $\Delta R_{\text{IB,c}}$ for CA

For the UE which supports inter-band NR CA configuration, the minimum requirement for reference sensitivity in clause 7.3.2 in TS 38.101-1 [2] and clause 7.3.2, 7.3A.2 in TS 38.101-2 [3] shall be increased by the amount given in  $\Delta R_{\text{IB,c}}$  in Tables below. Unless otherwise stated,  $\Delta R_{\text{IB,c}}$  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 TS 38.101-1 [2] and 7.3A, 7.3B in this specification, 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 TS 38.101-1 [2] and 7.3A, 7.3B in this specification for the applicable operating bands.

### 7.3A.3.1 $\Delta R_{IB,c}$ for Inter-band CA between FR1 and FR2

Unless otherwise stated,  $\Delta R_{IB,c}$  for NR FR1 band and FR2 band of inter-band CA defined in table 5.5A.1-1 is set to zero.

**Table 7.3A.3.1-1: Void**

## 7.3A.4 Void

## 7.3B Reference sensitivity level for DC

### 7.3B.1 General

For EN-DC, E-UTRA and NR single carrier, CA, and MIMO operation of REFSENS requirements defined in TS 38.101-1 [2], TS 38.101-2 [3] and TS 36.101 [4] apply to all downlink bands of EN-DC configurations listed in clause 5.5B, unless sensitivity degradation exception is allowed in this clause of this specification, clause 7.3 in TS 38.101-1 [2], clause 7.3 in TS 38.101-2 [3] or clause 7.3 in TS 36.101 [4]. Allowed exceptions specified in this clause also apply to any higher order EN-DC configuration combination containing one of the band combinations that exception is allowed for. Reference sensitivity exceptions are specified by applying maximum sensitivity degradation (MSD) into applicable REFSENS requirement. EN-DC REFSENS requirements shall be met for NR uplink transmissions using QPSK DFT-s-OFDM waveforms as defined in clause 7.3.2 [2]. Unless otherwise specified UL allocation uses the lowest SCS allowable for a given channel BW. Limits on configured maximum output power for the uplink according to clause 6.2B.4 shall apply.

In case of interband EN-DC the receiver REFSENS requirements in this clause do not apply for 1.4 and 3 MHz E-UTRA carriers. For the case of inter-band EN-DC with a single carrier per cell group and multi-carrier per cell group, in addition to the E-UTRA and NR single carrier, CA, and MIMO operation of REFSENS requirements defined in TS 38.101-1 [2], TS 38.101-2 [3], and TS 36.101 [4], the REFSENS requirements specified therein also apply with both downlink carriers and both uplink carriers active unless sensitivity exceptions are allowed in this clause of this specification, clause 7.3 in TS 38.101-1 [2] or clause 7.3 in TS 36.101 [4].

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 operations with 4 or 8 Rx antenna ports in an E-UTRA band or 4 Rx antenna ports in an NR band, the MSD in the applicable bands shall be increased by the absolute value of  $\Delta R_{IB,4R}$  in Table 7.3.1-1a or  $\Delta R_{IB,8R}$  in Table 7.3.1-1aa of TS 36.101[4] for the E-UTRA band or  $\Delta R_{IB,4R}$  in Table 7.3.2-2 of TS 38.101-1 for the NR band when  $MSD > 0$ .

NOTE: For inter-band EN-DC, the reference sensitivity requirement with both uplink carriers active is allowed to be verified for only a single inter-band EN-DC configuration per NR band.

### 7.3B.2 Reference sensitivity for DC

#### 7.3B.2.1 Intra-band contiguous EN-DC

For intra-band contiguous EN-DC configurations, the reference sensitivity power level REFSENS is the minimum mean power applied to each one of the UE antenna ports at which the throughput for the carrier(s) of the E-UTRA and NR CGs shall meet or exceed the requirements for the specified E-UTRA and NR reference measurement channels. The reference sensitivity requirements apply with all uplink carriers and all downlink carriers active for EN-DC configuration and Uplink EN-DC configuration listed in Table 5.5B.2-1 and Table 5.5B.3-1, as supported by the UE.

For EN-DC configurations where uplink is not available in either the MCG or the SCG or for EN-DC configurations where the UE only supports single uplink operation, reference sensitivity requirements apply with single uplink transmission. The downlink carrier(s) from the cell group with uplink shall be configured closer to the uplink operating band than any of the downlink carriers from the cell group without uplink.

Sensitivity degradation is allowed for Intra-band contiguous EN-DC configurations listed in Table 7.3B.2.1-1 the reference sensitivity is defined only for the specific uplink and downlink test points which are specified in Table 7.3B.2.1-1 and E-UTRA and NR single carrier requirements do not apply.

**Table 7.3B.2.1-1: Reference sensitivity (MSD) for intra-band contiguous EN-DC**

| EN-DC configuration / channel allocations /MSD  |                |                           |                         |                              |                           |          |             |  |
|---|----------------|---------------------------|-------------------------|------------------------------|---------------------------|----------|-------------|--|
| EN-DC configuration   | E-UTRA/NR band | F <sub>c</sub> (UL) (MHz) | Channel bandwidth (MHz) | UL allocation (LCRB)         | F <sub>c</sub> (DL) (MHz) | MSD (dB) | Duplex mode |  |
| DC_(n)71AA  | 71             | 665.5                     | 5                       | 5 (RB <sub>end</sub> = 24)   | 619.5                     | 0        | FDD         |  |
|   | n71            | 675.5                     | 15                      | 15 (RB <sub>start</sub> = 0) | 629.5                     | 1.8      |             |  |
| DC_(n)71AA  | 71             | 670.5                     | 15                      | 15 (RB <sub>end</sub> = 74)  | 624.5                     | 0        |             |  |
|   | n71            | 680.5                     | 5                       | 5 (RB <sub>start</sub> = 0)  | 634.5                     | 1.6      |             |  |
| DC_(n)71AA  | 71             | 668                       | 10                      | 10 (RB <sub>end</sub> = 49)  | 622                       | 0        |             |  |
|   | n71            | 678                       | 10                      | 10 (RB <sub>start</sub> = 0) | 632                       | 1.7      |             |  |
| DC_(n)71AA  | 71             | 668                       | 10                      | 10 (RB <sub>start</sub> = 0) | 622                       | 17.2     |             |  |
|   | n71            | 678                       | 10                      | 10 (RB <sub>end</sub> = 51)  | 632                       | 29.4     |             |  |
| NOTE 1: The transmitters powers shall be set to P <sub>UMAX</sub> , as defined in TS 38.101-1 [2], TS 38.101-2 [3], and TS 36.101 [4], with additional limits on configured maximum output power for the uplink according to clause 6.2B.4. |                |                           |                         |                              |                           |          |             |  |

**7.3B.2.2 Intra-band non-contiguous EN-DC**

For intra-band non-contiguous EN-DC configurations, the reference sensitivity power level REFSSENS is the minimum mean power applied to each one of the UE antenna ports at which the throughput for the carrier(s) of the E-UTRA and NR CGs shall meet or exceed the requirements for the specified E-UTRA and NR reference measurement channels.

For DC\_3A\_n3A intra-band non-contiguous EN-DC combination, only single switched UL is supported in rel.15 therefore, no MSD is specified and E-UTRA and NR single carrier requirements apply.

**7.3B.2.3 Inter-band EN-DC within FR1**

Reference sensitivity exceptions are specified for the condition when there is uplink transmission only in the aggressor band.

**7.3B.2.3.1 Reference sensitivity exceptions due to UL harmonic interference for EN-DC in NR FR1**

Sensitivity degradation is allowed for a band if it is impacted by UL harmonic interference from another band part of the same EN-DC configuration. Reference sensitivity exceptions for the victim band (high) are specified in Table 7.3B.2.3.1-1 with uplink configuration of the aggressor band (low) specified in Table 7.3B.2.3.1-2.

**Table 7.3B.2.3.1-1: Reference sensitivity exceptions (MSD) due to UL harmonic for EN-DC in NR FR1**

| E-UTRA or NR Band / Channel bandwidth of the affected DL band / MSD |                     |            |             |             |             |             |             |             |             |             |             |             |              |
|---|---------------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|
| UL band   | DL band             | 5 MHz (dB) | 10 MHz (dB) | 15 MHz (dB) | 20 MHz (dB) | 25 MHz (dB) | 30 MHz (dB) | 40 MHz (dB) | 50 MHz (dB) | 60 MHz (dB) | 80 MHz (dB) | 90 MHz (dB) | 100 MHz (dB) |
| 1, 3  | n77 <sup>2,13</sup> |            | 23.9        | 22.1        | 20.9        |             |             | 17.9        | 16.8        | 16.0        | 14.8        | 14.3        | 13.8         |
|   | n77 <sup>3</sup>    |            | 1.1         | 0.8         | 0.3         |             |             |             |             |             |             |             |              |
| 2   | n78 <sup>2,13</sup> |            | 23.9        | 22.1        | 20.9        |             |             | 17.9        | 16.8        | 16.0        | 14.8        | 14.3        | 13.8         |
|   | n78 <sup>3</sup>    |            | 1.1         | 0.8         | 0.3         |             |             |             |             |             |             |             |              |

|        |                       |      |      |      |      |  |  |      |      |      |      |      |      |
|--------|-----------------------|------|------|------|------|--|--|------|------|------|------|------|------|
| 3      | n78 <sup>2,13</sup>   |      | 23.9 | 22.1 | 20.9 |  |  | 17.9 | 16.8 | 16.0 | 14.8 | 14.3 | 13.8 |
|        | n78 <sup>3</sup>      |      | 1.1  | 0.8  | 0.3  |  |  |      |      |      |      |      |      |
| 5      | n78 <sup>6,7</sup>    |      | 10.5 | 8.9  | 7.8  |  |  | 5.4  | 4.2  | 3.5  | 2.3  | 2.1  | 1.4  |
| 8      | n77 <sup>6,7</sup>    |      | 10.8 | 9.1  | 8    |  |  | 5.1  | 4.2  | 3.5  | 2.3  | 2.1  | 1.4  |
|        | n78 <sup>6,7</sup>    |      |      |      |      |  |  |      |      |      |      |      |      |
| 8      | n79 <sup>4,5</sup>    |      |      |      |      |  |  | 6.8  | 6.2  | 5.6  | 4.9  |      | 4.4  |
| 12     | n66 <sup>8,9,10</sup> | 10   | 7.5  | 6.2  | 5.5  |  |  | 2.4  |      |      |      |      |      |
| 18, 19 | n77 <sup>4,5</sup>    |      | 10.4 | 8.9  | 7.8  |  |  | 4.7  | 3.7  | 3    | 1.7  | 1.2  | 0.7  |
|        | n78 <sup>4,5</sup>    |      |      |      |      |  |  |      |      |      |      |      |      |
| 28     | n51 <sup>2,13</sup>   | 27.8 |      |      |      |  |  |      |      |      |      |      |      |
|        | n51 <sup>3</sup>      | 1.9  |      |      |      |  |  |      |      |      |      |      |      |
| 28     | n77 <sup>4,5</sup>    |      | 10.4 | 8.9  | 7.8  |  |  | 4.7  | 3.7  | 3    | 1.7  | 1.2  | 0.7  |
|        | n78 <sup>4,5</sup>    |      |      |      |      |  |  |      |      |      |      |      |      |
| 20     | n77 <sup>6,7</sup>    |      | 10.8 | 9.1  | 8    |  |  | 6    | 4.0  | 3.2  | 2.0  | 1.5  | 1.0  |
|        | n78 <sup>6,7</sup>    |      |      |      |      |  |  |      |      |      |      |      |      |
| 26     | n41 <sup>8,9</sup>    |      | 10.3 | 8.4  | 7.4  |  |  | 5    | 4.3  | 3.9  | 3.1  | 2.9  | 2.7  |
| 26     | n77 <sup>6,7</sup>    |      | 10.8 | 9.1  | 8    |  |  | 6    | 4.0  | 3.2  | 2.0  | 1.5  | 1.0  |
|        | n78 <sup>6,7</sup>    |      |      |      |      |  |  |      |      |      |      |      |      |
| n28    | 1 <sup>8,9,10</sup>   | 10.2 | 7.6  | 6.2  | 5.3  |  |  |      |      |      |      |      |      |
| n71    | 2 <sup>11</sup>       | 4.6  | 1.0  | 0.7  | 0.6  |  |  |      |      |      |      |      |      |
|        | 2 <sup>12</sup>       | 1.7  | 1.0  | 0.7  | 0.6  |  |  |      |      |      |      |      |      |
| 66     | n78 <sup>2,13</sup>   |      | 23.9 | 22.1 | 20.9 |  |  | 17.9 | 16.8 | 16.0 | 14.8 | 14.3 | 13.8 |
|        | n78 <sup>3</sup>      |      | 1.1  | 0.8  | 0.3  |  |  |      |      |      |      |      |      |

- NOTE 1: Void
- NOTE 2: The requirements should be verified for UL EARFCN or NR ARFCN of the aggressor (lower) band (superscript LB) such that  $f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.2 \rfloor 0.1$  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 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  $2f_{UL}^{LB}$  in the victim (higher) band) with  $F_{UL\_low}^{LB} + BW_{Channel}^{LB} / 2 \leq f_{UL}^{LB} \leq F_{UL\_high}^{LB} - BW_{Channel}^{LB} / 2$ , whereand  $BW_{Channel}^{HB}$  are the channel bandwidths configured in the aggressor (lower) and victim (higher) bands in MHz, respectively.
- NOTE 4: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the aggressor (lower) band for which the 5<sup>th</sup> transmitter harmonic is within the downlink transmission bandwidth of a victim (higher) band.
- NOTE 5: The requirements should be verified for UL EARFCN of the aggressor (lower) band (superscript LB) such that  $f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.5 \rfloor 0.1$  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 6: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the aggressor (lower) band for which the 4<sup>th</sup> transmitter harmonic is within the downlink transmission bandwidth of a victim (higher) band.
- NOTE 7: The requirements should be verified for UL EARFCN of the aggressor (lower) band (superscript LB) such that  $f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.4 \rfloor 0.1$  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 8: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the aggressor (lower) band for which the 3<sup>rd</sup> transmitter harmonic is within the downlink transmission bandwidth of a victim (higher) band.
- NOTE 9: The requirements should be verified for UL EARFCN of the aggressor (lower) band (superscript LB) such that  $f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.3 \rfloor 0.1$  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 10: Void.
- NOTE 11: These requirements apply when the lower edge frequency of the 5 MHz uplink channel in Band 71 is located at or below 668 MHz and the downlink channel in Band 2 is located with its upper edge at 1990 MHz.
- NOTE 12: 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 2 is located with its upper edge at 1990 MHz.
- NOTE 13: 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> transmitter harmonic is within the downlink transmission bandwidth of a victim (higher) band and a range  $\Delta F_{HD}$  above and below the edge of this downlink transmission

bandwidth. The value  $\Delta F_{HD}$  depends on the EN-DC band combination:  $\Delta F_{HD} = 10$  MHz for DC\_1\_n77, DC\_2\_n77, DC\_66\_n77, DC\_3\_n77, DC\_3\_n78, DC\_28\_n51, DC\_66\_n78.  
 NOTE 14: MSD test point can be chosen according to supported BW and lowest SCS supported by the UE.

**Table 7.3B.2.3.1-2: Uplink configuration for reference sensitivity exceptions due to UL harmonic interference for EN-DC in NR FR1**

| E-UTRA or NR Band / Channel bandwidth of the affected DL band / UL RB allocation of the agressor band |          |                      |                                   |                                   |                                   |                                   |               |               |               |               |               |               |               |                |
|---|----------|----------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|----------------|
| UL band   | DL band  | SCS of UL band (kHz) | 5 MHz (LCRB)                      | 10 MHz (LCRB)                     | 15 MHz (LCRB)                     | 20 MHz (LCRB)                     | 25 MHz (LCRB) | 30 MHz (LCRB) | 40 MHz (LCRB) | 50 MHz (LCRB) | 60 MHz (LCRB) | 80 MHz (LCRB) | 90 MHz (LCRB) | 100 MHz (LCRB) |
| 1   | n77      | 15                   |                                   | 25                                | 36                                | 50                                |               |               | 100           | 100           | 100           | 100           | 100           | 100            |
| 2   | n78      | 15                   |                                   | 25                                | 36                                | 50                                |               |               | 50            | 50            | 50            | 50            | 50            | 50             |
| 3   | n77, n78 | 15                   |                                   | 25                                | 36                                | 50                                |               |               | 50            | 50            | 50            | 50            | 50            | 50             |
| 5   | n78      | 15                   |                                   | 16                                | 25                                | 25                                |               |               | 25            | 25            | 25            | 25            | 25            | 25             |
| 8   | n77 n78  | 15                   |                                   | 16                                | 25                                | 25                                |               |               | 25            | 25            | 25            | 25            | 25            | 25             |
| 8   | n79      | 15                   |                                   |                                   |                                   |                                   |               |               | 25            | 25            | 25            | 25            |               | 25             |
| 12  | n66      | 15                   | 8                                 | 16                                | 20                                | 20                                |               |               | 20            |               |               |               |               |                |
| 18  | n77, n78 | 15                   |                                   | 16                                | 25                                | 25                                |               |               | 25            | 25            | 25            | 25            | 25            | 25             |
| 19  | n77, n78 | 15                   |                                   | 16                                | 25                                | 25                                |               |               | 25            | 25            | 25            | 25            | 25            | 25             |
| 20  | n77, n78 | 15                   |                                   | 16                                | 25                                | 25                                |               |               | 25            | 25            | 25            | 25            | 25            | 25             |
| 26  | n41      | 15                   |                                   | 16                                | 25                                | 25                                |               |               | 25            | 25            | 25            | 25            | 25            | 25             |
| 26  | n77, n78 | 15                   |                                   | 16                                | 25                                | 25                                |               |               | 25            | 25            | 25            | 25            | 25            | 25             |
| n28   | 1        | 15                   | 8                                 | 16                                | 25                                | 25                                |               |               |               |               |               |               |               |                |
| 28  | n51      | 15                   | 12                                |                                   |                                   |                                   |               |               |               |               |               |               |               |                |
| 28  | n77, n78 | 15                   |                                   | 10                                | 15                                | 20                                |               |               | 25            | 25            | 25            | 25            | 25            | 25             |
| 66  | n78      | 15                   |                                   | 25                                | 36                                | 50                                |               |               | 100           | 100           | 100           | 100           | 100           | 100            |
| n71   | 2        | 15                   | 25 <sup>4</sup><br>8 <sup>5</sup> | 25 <sup>4</sup><br>8 <sup>5</sup> | 20 <sup>4</sup><br>8 <sup>5</sup> | 20 <sup>4</sup><br>8 <sup>5</sup> |               |               |               |               |               |               |               |                |

NOTE 1: The UL configuration applies regardless of the channel bandwidth of the UL band unless the UL resource blocks exceed that specified in Table 7.3.1-2 in TS 36.101 [4] or Table 7.3.2-3 in TS 38.101-1 [2] for the uplink bandwidth in which case the allocation according to Table 7.3.1-2 in TS 36.101 [4] or Table 7.3.2-3 in TS 38.101-1 [2] applies

NOTE 2: Void

NOTE 3: Unless stated otherwise, UL resource blocks shall be centred within the transmission bandwidth configuration for the channel bandwidth.

NOTE 4: These requirements apply when the lower edge frequency of the 5 MHz uplink channel in Band 71 is located at or below 668 MHz and the downlink channel in Band 2 is located with its upper edge at 1990 MHz.

NOTE 5: 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 2 is located with its upper edge at 1990 MHz.

NOTE 6: If the aggressor band is NR band, the test SCS and UL RB can be adjusted according to supported BW and lowest SCS supported by the UE

**7.3B.2.3.2 Reference sensitivity exceptions due to receiver harmonic mixing for EN-DC in NR FR1**

Sensitivity degradation is allowed for a band if it is impacted by receiver harmonic mixing due to another band part of the same EN-DC configuration. Reference sensitivity exceptions for the victim band (low) are specified in Table 7.3B.2.3.2-1 with uplink configuration of the agressor band (high) specified in Table 7.3B.2.3.2-2.

**Table 7.3B.2.3.2-1: Reference sensitivity exceptions (MSD) due to receiver harmonic mixing for EN-DC in NR FR1**

| E-UTRA or NR Band / Channel bandwidth of the affected DL band / MSD |                  |            |             |             |             |             |             |             |             |             |             |              |
|---|------------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|
| UL band   | DL band          | 5 MHz (dB) | 10 MHz (dB) | 15 MHz (dB) | 20 MHz (dB) | 25 MHz (dB) | 40 MHz (dB) | 50 MHz (dB) | 60 MHz (dB) | 80 MHz (dB) | 90 MHz (dB) | 100 MHz (dB) |
| 2   | n71 <sup>4</sup> | 26.8       | 23.6        | 21.2        | 15.6        |             |             |             |             |             |             |              |
|   |                  |            |             |             |             |             |             |             |             |             |             |              |
| n41   | 26 <sup>4</sup>  | 24.3       | 24.3        | 22.5        | N/A         |             |             |             |             |             |             |              |
|   |                  |            |             |             |             |             |             |             |             |             |             |              |
| n77   | 3                | 5.7        | 4.0         | 3.0         | 2.7         |             |             |             |             |             |             |              |
| n78   | 3                | 5.7        | 4.0         | 3.0         | 2.7         |             |             |             |             |             |             |              |
| n77   | 19               | 7.2        | 5.0         | 3.8         |             |             |             |             |             |             |             |              |
| n77   | 41 <sup>8</sup>  | 10.4       | 10.4        | 10.4        | 10.4        |             |             |             |             |             |             |              |
| n77   | 28 <sup>2</sup>  | 28         | 25          | 23.2        | 22          |             |             |             |             |             |             |              |
| n78   | 19               | 7.2        | 5.0         | 3.8         |             |             |             |             |             |             |             |              |
| n78   | 41 <sup>8</sup>  | 10.4       | 10.4        | 10.4        | 10.4        |             |             |             |             |             |             |              |
| n79   | 11 <sup>4</sup>  | 39.3       | 36.3        | 34.5        |             |             |             |             |             |             |             |              |
| n79   | 19 <sup>2</sup>  | 29.5       | 26.5        | 24.7        |             |             |             |             |             |             |             |              |
| n79   | 21 <sup>4</sup>  | 39.3       | 36.3        | 34.5        |             |             |             |             |             |             |             |              |
| n79   | 26 <sup>2</sup>  | 27         | 24          | 22.2        |             |             |             |             |             |             |             |              |
| n79   | 8 <sup>2</sup>   | 25         | 22          |             |             |             |             |             |             |             |             |              |

NOTE 1: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the aggressor (higher) band for which the mixing product due to harmonic of victim (lower) band LO with leakage of aggressor (higher) band is within the downlink transmission bandwidth of a victim (lower) band.

NOTE 2: The requirements should be verified for DL EARFCN of the victim (lower) band (superscript LB) such that  $f_{DL}^{LB} = \lfloor f_{UL}^{HB} / 0.5 \rfloor 0.1$  with  $f_{DL}^{LB}$  the DL carrier frequency in the lower band and  $f_{UL}^{HB}$  the UL carrier frequency in the higher band, both in MHz.

NOTE 3: Void

NOTE 4: The requirements should be verified for DL EARFCN or NR-ARFCN of the victim (lower) band (superscript LB) such that  $f_{DL}^{LB} = \lfloor f_{UL}^{HB} / 0.3 \rfloor 0.1$  with  $f_{DL}^{LB}$  the DL carrier frequency in the lower band and  $f_{UL}^{HB}$  the UL carrier frequency in the higher band, both in MHz.

NOTE 5: Void

NOTE 6: Void

NOTE 7: Void

NOTE 8: The requirements should be verified for DL EARFCN of the victim (lower) band (superscript LB) such that  $f_{DL}^{LB} = \lfloor f_{UL}^{HB} / 0.15 \rfloor 0.1$  with  $f_{DL}^{LB}$  the DL carrier frequency in the lower band and  $f_{UL}^{HB}$  the UL carrier frequency in the higher band, both in MHz.

NOTE 9: MSD test point can be chosen according to supported BW and lowest SCS supported by the UE.

**Table 7.3B.2.3.2-2: Uplink configuration for reference sensitivity exceptions due to receiver harmonic mixing for EN-DC in NR FR1**

| E-UTRA or NR Band / SCS / Channel bandwidth of the affected DL band / UL RB allocation of the aggressor band |         |                      |              |               |               |               |               |               |               |               |               |               |                |
|--|---------|----------------------|--------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|----------------|
| UL band  | DL band | SCS of UL band (kHz) | 5 MHz (LCRB) | 10 MHz (LCRB) | 15 MHz (LCRB) | 20 MHz (LCRB) | 25 MHz (LCRB) | 40 MHz (LCRB) | 50 MHz (LCRB) | 60 MHz (LCRB) | 80 MHz (LCRB) | 90 MHz (LCRB) | 100 MHz (LCRB) |
| 2  | n71     | 15                   | 25           | 50            | 50            | 50            |               |               |               |               |               |               |                |
|  |         |                      |              |               |               |               |               |               |               |               |               |               |                |
| n41  | 26      | 15                   | 25           | 50            | 75            |               |               |               |               |               |               |               |                |
|  |         |                      |              |               |               |               |               |               |               |               |               |               |                |
|  |         |                      |              |               |               |               |               |               |               |               |               |               |                |

|     |    |    |    |    |    |     |  |  |  |  |  |  |  |
|-----|----|----|----|----|----|-----|--|--|--|--|--|--|--|
| n77 | 3  | 15 | 25 | 50 | 75 | 100 |  |  |  |  |  |  |  |
| n77 | 19 | 15 | 25 | 50 | 75 |     |  |  |  |  |  |  |  |
| n78 | 3  | 15 | 25 | 50 | 75 | 100 |  |  |  |  |  |  |  |
| n77 | 28 | 15 | 25 | 50 | 75 | 100 |  |  |  |  |  |  |  |
| n78 | 19 | 15 | 25 | 50 | 75 |     |  |  |  |  |  |  |  |
| n77 | 41 | 15 | 12 | 25 | 36 | 50  |  |  |  |  |  |  |  |
| n78 | 41 | 15 | 12 | 25 | 36 | 50  |  |  |  |  |  |  |  |
| n79 | 11 | 15 | 25 | 50 | 75 |     |  |  |  |  |  |  |  |
| n79 | 19 | 15 | 25 | 50 | 75 |     |  |  |  |  |  |  |  |
| n79 | 21 | 15 | 25 | 50 | 75 |     |  |  |  |  |  |  |  |
| n79 | 26 | 15 | 25 | 50 | 75 |     |  |  |  |  |  |  |  |
| n79 | 8  | 15 | 25 | 50 |    |     |  |  |  |  |  |  |  |

NOTE 1: Void  
 NOTE 2: Void  
 NOTE 3: The UL configuration applies regardless of the channel bandwidth of the UL band. UL resource blocks allocation in the table shall be further limited to that specified in Table 7.3.1-2 in TS 36.101 [4] or Table 7.3.2-3 in TS 38.101-1 [2].  
 NOTE 4: Unless otherwise stated, the UL resource blocks allocation is applied at the center of the channel bandwidth. The note applies to the entire table.  
 NOTE 5: If the aggressor band is NR band, the test SCS and UL RB can be adjusted according to supported BW and lowest SCS supported by the UE.

7.3B.2.3.3 Void

7.3B.2.3.4 Reference sensitivity exceptions due to cross band isolation for EN-DC in NR FR1

Sensitivity degradation is allowed for a band if it is impacted by UL of another band part of the same EN-DC configuration due to cross band isolation issues. Reference sensitivity exceptions for the victim band are specified in Table 7.3B.2.3.4-1 with uplink configuration of the aggressor band specified in Table 7.3B.2.3.4-2.

**Table 7.3B.2.3.4-1: Reference sensitivity exceptions (MSD) due to cross band isolation for EN-DC in NR FR1**

| UL band | E-UTRA or NR Band / Channel bandwidth of the affected DL band / MSD |            |             |             |             |             |             |             |             |             |             |             |              |
|---------|---|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|
|         | DL band   | 5 MHz (dB) | 10 MHz (dB) | 15 MHz (dB) | 20 MHz (dB) | 25 MHz (dB) | 30 MHz (dB) | 40 MHz (dB) | 50 MHz (dB) | 60 MHz (dB) | 80 MHz (dB) | 90 MHz (dB) | 100 MHz (dB) |
| 1       | n40   | 6.6        | 6.6         | 6.6         | 6.6         | 6.6         | 6.6         | 6.6         | 6.6         | 6.6         | 6.6         |             |              |
| n40     | 1   | 8.3        | 8.3         | 8.3         | 8.3         |             |             |             |             |             |             |             |              |
| n41     | 25  | 0.6        | 0.6         | 0.6         | 0.6         |             |             |             |             |             |             |             |              |
| n77     | 41 <sup>1</sup>   | 4.5        | 4.5         | 4.5         | 4.5         |             |             |             |             |             |             |             |              |
| 41      | n77   |            | 8.3         | 8.3         | 8.3         |             | 6.3         | 5.3         | 4.5         | 4.0         | 3.9         | 3.8         |              |
| 3       | n51   | 6.4        |             |             |             |             |             |             |             |             |             |             |              |
| 30      | n66   | 8.3        | 8.3         | 8.3         | 8.3         |             | 8.3         |             |             |             |             |             |              |
| n78     | 7 <sup>1</sup>  | 4.5        | 4.5         | 4.5         | 4.5         |             |             |             |             |             |             |             |              |
| n78     | 38  | 3.3        | 3.3         | 3.3         | 3.3         |             |             |             |             |             |             |             |              |
| n78     | 41 <sup>1</sup>   | 4.5        | 4.5         | 4.5         | 4.5         |             |             |             |             |             |             |             |              |
| n78     | 46  |            |             |             | 7           |             |             |             |             |             |             |             |              |
| 41      | n78   |            | 8.3         | 8.3         | 8.3         |             | 6.3         | 5.3         | 4.5         | 4.0         | 3.9         | 3.8         |              |
| n79     | 42 <sup>4</sup>   | 2.8        | 2.8         | 2.8         | 2.8         |             |             |             |             |             |             |             |              |

NOTE 1: Applicable only when harmonic mixing MSD for this combination is not applied.  
 NOTE 2: The DL victim band should be configured using the lowest SCS that is compatible with the highest CBW for which an MSD is specified.  
 NOTE 3: MSD test point can be chosen according to supported BW and lowest SCS supported by the UE.

NOTE 4: The requirements only apply for UEs supporting inter-band DC\_42\_n79 ENDC with simultaneous Rx/Tx capability. Simultaneous Rx/Tx capability does not apply for UEs supporting band 42 with a n77 implementation only. These restrictions are applicable to related higher order configurations.

**Table 7.3B.2.3.4-2: Uplink configuration for reference sensitivity exceptions due to cross band isolation for EN-DC in NR FR1**

| UL band | E-UTRA or NR Band / SCS / Channel bandwidth of the affected DL band / UL RB allocation of the agressor band |                      |                           |                            |                            |                            |                            |                            |                            |                            |                            |                            |                            |                             |
|---------|---|----------------------|---------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|
|         | DL band   | SCS of UL band (kHz) | 5 MHz (L <sub>CRB</sub> ) | 10 MHz (L <sub>CRB</sub> ) | 15 MHz (L <sub>CRB</sub> ) | 20 MHz (L <sub>CRB</sub> ) | 25 MHz (L <sub>CRB</sub> ) | 30 MHz (L <sub>CRB</sub> ) | 40 MHz (L <sub>CRB</sub> ) | 50 MHz (L <sub>CRB</sub> ) | 60 MHz (L <sub>CRB</sub> ) | 80 MHz (L <sub>CRB</sub> ) | 90 MHz (L <sub>CRB</sub> ) | 100 MHz (L <sub>CRB</sub> ) |
| 1       | n40   | 15                   | 25                        | 50                         | 75                         | 100                        | 100                        | 100                        | 100                        | 100                        | 100                        | 100                        |                            |                             |
| n40     | 1   | 15                   | 25                        | 50                         | 75                         | 100                        |                            |                            |                            |                            |                            |                            |                            |                             |
| n41     | 25  | 30                   | 160                       | 160                        | 160                        | 160                        |                            |                            |                            |                            |                            |                            |                            |                             |
| n77     | 41  | 30                   | 270                       | 270                        | 270                        | 270                        |                            |                            |                            |                            |                            |                            |                            |                             |
| 41      | n77   | 15                   |                           | 100                        | 100                        | 100                        |                            |                            | 100                        | 100                        | 100                        | 100                        | 100                        | 100                         |
| 3       | n51   | 15                   | 25                        |                            |                            |                            |                            |                            |                            |                            |                            |                            |                            |                             |
| 30      | n66   | 15                   | 25                        | 25                         | 25                         | 25                         |                            |                            | 25                         |                            |                            |                            |                            |                             |
| n78     | 7   | 30                   | 270                       | 270                        | 270                        | 270                        |                            |                            |                            |                            |                            |                            |                            |                             |
| n78     | 38  | 30                   | 270                       | 270                        | 270                        | 270                        |                            |                            |                            |                            |                            |                            |                            |                             |
| n78     | 41  | 30                   | 270                       | 270                        | 270                        | 270                        |                            |                            |                            |                            |                            |                            |                            |                             |
| n78     | 46  | 30                   |                           |                            |                            | 270                        |                            |                            |                            |                            |                            |                            |                            |                             |
| 41      | n78   | 15                   |                           | 100                        | 100                        | 100                        |                            |                            | 100                        | 100                        | 100                        | 100                        | 100                        | 100                         |
| n79     | 42  | 30                   | 270 <sup>4</sup>          | 270 <sup>4</sup>           | 270 <sup>4</sup>           | 270 <sup>4</sup>           |                            |                            |                            |                            |                            |                            |                            |                             |

NOTE 1: The UL configuration applies regardless of the channel bandwidth of the UL band. UL resource blocks allocation in the table shall be further limited to that specified in Table 7.3.1-2 in TS 36.101 [4] or Table 7.3.2-3 in TS 38.101-1 [2].

NOTE 2: When the maximum UL RB allocation "L<sub>CRB</sub>" value is less than the maximum transmission bandwidth configuration "N<sub>RB</sub>" defined in Table 5.3.2-1 in 38.101-1 [2] for the specified UL band SCS, the UL band should be configured using the lowest CBW that is compatible with the maximum specified L<sub>CRB</sub> value.

NOTE 3: If the aggressor band is NR band, the test SCS and UL RB can be adjusted according to supported BW and lowest SCS supported by the UE.

NOTE 4: The requirements only apply for UEs supporting inter-band ENDC with simultaneous Rx/Tx capability. Simultaneous Rx/Tx capability does not apply for UEs supporting band 42 with a n77 implementation only. These restrictions are applicable to related higher order configurations.

**7.3B.2.3.5 MSD for intermodulation interference due to dual uplink operation for EN-DC in NR FR1**

For EN-DC configurations in NR FR1 the UE may indicate capability of not supporting simultaneous dual uplink operation due to possible intermodulation interference overlapping in frequency to its own primary downlink channel bandwidth if

- the intermodulation order is 2;
- the intermodulation order is 3 when both operating bands are between 450 MHz – 960 MHz or between 1427 MHz – 2690 MHz

In the case for EN-DC configurations in NR FR1 for which the intermodulation products caused by dual uplink operation do not interfere with its own primary downlink channel bandwidth as defined in Annex I the UE is mandated to operate in dual and triple uplink mode.

For EN-DC configurations in NR FR1 with uplink and downlink assigned to E-UTRA and NR FR1 bands given in Table 7.3B.2.3.5.1-1, Table 7.3B.2.3.5.2-0 and Table 7.3B.2.3.5.2-1 the reference sensitivity is defined only for the specific uplink and downlink test points specified in Table 7.3B.2.3.5.1-1, Table 7.3B.2.3.5.2-0 and Table 7.3B.2.3.5.2-1. For these test points the reference sensitivity levels specified in clause 7.3.1 in TS 36.101 [4] and 7.3.2 of TS 38.101-1 [2] for the corresponding channel bandwidths or in clause 7.3.1 of TS 36.101 [4] are relaxed by the amount of the parameter MSD given in Table 7.3B.2.3.5.1-1, Table 7.3B.2.3.5.2-0 and Table 7.3B.2.3.5.2-1.

The throughput on each of the CGs shall be  $\geq 95\%$  of the maximum throughput of the respective reference measurement channels as specified in Annex A of TS 38.101-1 [2] and Annex A of TS 36.101 [4], with parameters specified in Table 7.3B.2.3.5.1-1, Table 7.3B.2.3.5.2-0 and Table 7.3B.2.3.5.2-1 with dual UL transmissions overlapping in time unless otherwise stated.

7.3B.2.3.5.1 MSD test points for intermodulation interference due to dual uplink operation for EN-DC in NR FR1 involving two bands

**Table 7.3B.2.3.5.1-1: MSD test points for PCell due to dual uplink operation for EN-DC in NR FR1 (two bands)**

| NR or E-UTRA Band / Channel bandwidth / N <sub>RB</sub> / MSD        |                  |                         |                |                     |                         |          |                   |
|--|------------------|-------------------------|----------------|---------------------|-------------------------|----------|-------------------|
| EN-DC Configuration  | EUTRA or 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) | IMD order         |
| DC_1A_n77A   | 1                | 1950                    | 5              | 25                  | 2140                    | 29.8     | IMD2 <sup>3</sup> |
|  | n77              | 4090                    | 10             | 50                  | 4090                    | N/A      | N/A               |
| DC_1A_n77A,<br>DC_1A_n78A,<br>DC_1A_SUL_n78A-<br>n84A                | 1                | 1950                    | 5              | 25                  | 2140                    | 8.0      | IMD4 <sup>3</sup> |
|  | n77,<br>n78      | 3710                    | 10             | 50                  | 3710                    | N/A      | N/A               |
| DC_2A_n66A   | 2                | 1855                    | 5              | 25                  | 1935                    | 20       | IMD3              |
|  | n66              | 1775                    | 5              | 25                  | 2175                    | N/A      | N/A               |
| DC_2A_n66A   | 2                | 1883.3                  | 5              | 25                  | 1963.3                  | N/A      | N/A               |
|  | n66              | 1750                    | 5              | 25                  | 2150                    | 4        | IMD5              |
| DC_2A_n78A   | 2                | 1855                    | 5              | 25                  | 1935                    | 26       | IMD2 <sup>3</sup> |
|  | n78              | 3790                    | 10             | 50                  | 3790                    | N/A      | N/A               |
| DC_2A_n78A   | 2                | 1885                    | 5              | 25                  | 1965                    | 8.0      | IMD4 <sup>3</sup> |
|  | n78              | 3690                    | 10             | 50                  | 3690                    | N/A      | N/A               |
| DC_3A_n7A  | 3                | 1730                    | 5              | 25                  | 1825                    | N/A      | N/A               |
|  | n7               | 2535                    | 10             | 50                  | 2655                    | 10.2     | IMD4              |
| DC_3A_n77A,<br>DC_3A_n78A,<br>DC_3A-SUL_n78A-<br>n80A,<br>DC_3C_n78A | 3                | 1740                    | 5              | 25                  | 1835                    | 26       | IMD2 <sup>3</sup> |
|  | n77,<br>n78      | 3575                    | 10             | 50                  | 3575                    | N/A      | N/A               |
| DC_3A_n77A,<br>DC_3A_n78A,<br>DC_3A-SUL_n78A-<br>n80A,<br>DC_3C_n78A | 3                | 1765                    | 5              | 25                  | 1860                    | 8.0      | IMD4 <sup>3</sup> |
|  | n77,<br>n78      | 3435                    | 10             | 50                  | 3435                    | N/A      | N/A               |
| DC_5A_n66A   | 5                | 838                     | 5              | 25                  | 883                     | 30       | IMD2 <sup>3</sup> |
|  | n66              | 1721                    | 5              | 25                  | 2121                    | N/A      | N/A               |
| DC_5A_n78A   | 5                | 844                     | 5              | 25                  | 889                     | 8.3      | IMD4              |
|  | n78              | 3421                    | 10             | 50                  | 3421                    | N/A      | N/A               |
| DC_8A_n77A,<br>DC_8A_n78A,<br>DC_8A-SUL_n78A-<br>n81A                | 8                | 897.5                   | 5              | 25                  | 942.5                   | 8.3      | IMD4              |
|  | n77,<br>n78      | 3635                    | 10             | 50                  | 3635                    | N/A      | N/A               |
| DC_8A_n79A,<br>DC_8A-SUL_n79A-<br>n81A                               | 8                | 897.5                   | 5              | 25                  | 942.5                   | 4.8      | IMD5              |
|  | n79              | 4532.5                  | 40             | 216                 | 4532.5                  | N/A      | N/A               |
| DC_18A_n77A,<br>DC_18A_n78A  | 18               | N/A                     | N/A            | N/A                 | N/A                     | N/A      | IMD4              |
|  | n77,<br>n78      | N/A                     | N/A            | N/A                 | N/A                     | N/A      | N/A               |
| DC_19A_n77A  | 19               | 836.5                   | 5              | 25                  | 881.5                   | 13.6     | IMD4 <sup>3</sup> |
|  | n77              | 3391                    | 10             | 50                  | 3391                    | N/A      | N/A               |
| DC_19A_n78A  | 19               | 836.5                   | 5              | 25                  | 881.5                   | 13.6     | IMD4              |
|  | n78              | 3391                    | 10             | 50                  | 3391                    | N/A      | N/A               |
| DC_20A_n8A   | 20               | 849.5                   | 5              | 25                  | 808.5                   | 25       | IMD3              |
|  | n8               | 892.5                   | 5              | 25                  | 937.5                   | 25       | IMD3              |
| DC_20A_n77A,<br>DC_20A_n78A,<br>DC_20A-<br>SUL_n78A-n82A             | 20               | 850                     | 5              | 25                  | 809                     | 11       | IMD4              |
|  | n77,<br>n78      | 3359                    | 10             | 50                  | 3359                    | N/A      | N/A               |



| NR or E-UTRA Band / Channel bandwidth / N <sub>RB</sub> / MSD |                  |                         |                |                     |                         |          |                   |
|---|------------------|-------------------------|----------------|---------------------|-------------------------|----------|-------------------|
| EN-DC Configuration   | EUTRA or 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) | IMD order         |
| DC_20A_n77A   | 20               | 840                     | 5              | 25                  | 799                     | 6.5      | IMD5              |
|   | n77              | 4159                    | 10             | 50                  | 4159                    | N/A      | N/A               |
| DC_21A_n79A   | 21               | 1457.5                  | 5              | 25                  | 1505.5                  | 18.4     | IMD3              |
|   | n79              | 4420.5                  | 40             | 216                 | 4420.5                  | N/A      | N/A               |
| DC_26A_n41A   | 26               | 839                     | 5              | 25                  | 884                     | 15.6     | IMD3 <sup>3</sup> |
|   | n41              | 2562                    | 10             | 50                  | 2562                    | N/A      | N/A               |
| DC_28A_n51A   | 28               | 742.3                   | 5              | 25                  | 797.3                   | 5        | IMD4              |
|   | n51              | 1429.5                  | 5              | 25                  | 1429.5                  | N/A      | N/A               |
| DC_26A_n77A, DC_26A_n78A                                      | 26               | 836.5                   | 5              | 25                  | 881.5                   | 11.1     | IMD4              |
|   | n77, n78         | 3391                    | 10             | 50                  | 3391                    | N/A      | N/A               |
| DC_28A_n77A, DC_28A_n78A, DC_28A-SUL_n78A-n83A                | 28               | 705.5                   | 5              | 25                  | 760.5                   | 5.5      | IMD5              |
|   | n77, n78         | 3582.5                  | 10             | 50                  | 3582.5                  | N/A      | N/A               |
| DC_66A_n5A  | n5               | 838                     | 5              | 25                  | 883                     | 30       | IMD2 <sup>3</sup> |
|   | 66               | 1721                    | 5              | 25                  | 2121                    | N/A      | N/A               |
| DC_66A_n71A   | 66               | 1750                    | 5              | 25                  | 2150                    | 5        | IMD4              |
|   | n71              | 675                     | 5              | 25                  | 629                     | N/A      | N/A               |
| DC_66A_n78A   | 66               | 1730                    | 5              | 25                  | 2130                    | 5.0      | IMD5              |
|   | n78              | 3660                    | 5              | 50                  | 3660                    | N/A      | N/A               |

NOTE 1: Both of the transmitters shall be set min(+20 dBm, P<sub>CMAX,L,c</sub>) as defined in clause 6.2.5A.  
 NOTE 2: RB<sub>start</sub> = 0  
 NOTE 3: This band is subject to IMD5 also which MSD is not specified.  
 NOTE 4: Void.  
 NOTE 5: Void  
 NOTE 6: For NR band, UL/DL BW and UL L<sub>CRB</sub> can be adjusted according to the supported BW and lowest SCS supported by the UE.

7.3B.2.3.5.2 MSD test points for intermodulation interference due to dual uplink operation for EN-DC in NR FR1 involving three bands

Table 7.3B.2.3.5.2-0: MSD test points for Pcell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| NR or E-UTRA Band / Channel bandwidth / N <sub>RB</sub> / MSD |               |                         |                |                             |                         |          |           |
|---|---------------|-------------------------|----------------|-----------------------------|-------------------------|----------|-----------|
| EN-DC Configuration   | EUTRA/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) | IMD order |
| DC_66A_(n)71AA  | 66            | 1750                    | 5              | 25                          | 2150                    | 5        | IMD4      |
|   | n71           | 678                     | 10             | 10 (RB <sub>start</sub> =0) | 632                     | N/A      | N/A       |

NOTE 1: For NR band, UL/DL BW and UL L<sub>CRB</sub> can be adjusted according to the supported BW and lowest SCS supported by the UE.

Table 7.3B.2.3.5.2-1: MSD test points for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| NR or E-UTRA Band / Channel bandwidth / N <sub>RB</sub> / MSD |                 |                         |                |                     |                         |          |           |
|---|-----------------|-------------------------|----------------|---------------------|-------------------------|----------|-----------|
| EN-DC Configuration   | EUTRA / 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) | IMD order |
| DC_1A-3A_n28A   | 1               | 1975                    | 5              | 25                  | 2165                    | N/A      | N/A       |
|   | n28             | 710.5                   | 5              | 25                  | 765.5                   | N/A      | N/A       |
|   | 3               | 1723.5                  | 5              | 25                  | 1818.5                  | 4.0      | IMD5      |
| DC_1A-3A_n28A   | 3               | 1780                    | 5              | 25                  | 1875                    | N/A      | N/A       |
|   | n28             | 710.5                   | 5              | 25                  | 765.5                   | N/A      | N/A       |

| NR or E-UTRA Band / Channel bandwidth / NRB / MSD |                 |                         |                |                     |                         |          |           |
|---|-----------------|-------------------------|----------------|---------------------|-------------------------|----------|-----------|
| EN-DC Configuration                               | EUTRA / 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) | IMD order |
| DC_1A-7A_n28A                                     | 1               | 1949                    | 5              | 25                  | 2139                    | 11.0     | IMD4      |
|   | 1               | 1935                    | 5              | 25                  | 2125                    | N/A      | N/A       |
|   | n28             | 718                     | 5              | 25                  | 773                     | N/A      | N/A       |
| DC_1A-3A_n77A<br>DC_1A-3A_n77C                    | 7               | 2533                    | 10             | 50                  | 2653                    | 30.0     | IMD2      |
|   | 1               | 1950                    | 5              | 25                  | 2140                    | N/A      | N/A       |
|   | 3               | 1712.5                  | 5              | 25                  | 1807.5                  | 31.5     | IMD2      |
|   | n77             | 3757.5                  | 10             | 50                  | 3757.5                  | N/A      | N/A       |
|   | 1               | 1950                    | 5              | 25                  | 2140                    | N/A      | N/A       |
|   | 3               | 1775                    | 5              | 25                  | 1870                    | 8.5      | IMD4      |
|   | n77             | 3980                    | 10             | 50                  | 3980                    | N/A      | N/A       |
|   | 1               | 1950                    | 5              | 25                  | 2140                    | 31.0     | IMD2      |
| DC_1A-3A_n78A<br>DC_1A-3A_n78C<br>DC_1A-3C_n78A   | 3               | 1775                    | 5              | 25                  | 1870                    | N/A      | N/A       |
|   | n77             | 3915                    | 10             | 50                  | 3915                    | N/A      | N/A       |
|   | 1               | 1950                    | 5              | 25                  | 2140                    | N/A      | N/A       |
|   | 3               | 1712.5                  | 5              | 25                  | 1807.5                  | 31.2     | IMD2      |
|   | n78             | 3757.5                  | 10             | 50                  | 3757.5                  | N/A      | N/A       |
|   | 1               | 1935                    | 5              | 25                  | 2125                    | 2.8      | IMD5      |
| DC_1A-5A_n78A                                     | 3               | 1775                    | 5              | 25                  | 1870                    | N/A      | N/A       |
|   | n78             | 3725                    | 10             | 50                  | 3725                    | N/A      | N/A       |
|   | 1               | 1932                    | 5              | 25                  | 2122                    | 18.1     | IMD3      |
|   | 5               | 829                     | 5              | 25                  | 874                     | N/A      | N/A       |
|   | n78             | 3780                    | 10             | 50                  | 3780                    | N/A      | N/A       |
|   | 1               | 1975                    | 5              | 25                  | 2165                    | N/A      | N/A       |
| DC_1A-7A_n78A                                     | 5               | 840                     | 5              | 25                  | 885                     | 3.1      | IMD5      |
|   | n78             | 3405                    | 10             | 50                  | 3405                    | N/A      | N/A       |
|   | 1               | 1977.5                  | 5              | 25                  | 2167.5                  | N/A      | N/A       |
|   | 7               | 2507.5                  | 5              | 25                  | 2627.5                  | 9.1      | IMD4      |
|   | n78             | 3305                    | 10             | 50                  | 3305                    | N/A      | N/A       |
|   | 1               | 1950                    | 5              | 25                  | 2140                    | 8.7      | IMD4      |
| DC_1A-8A_n78A                                     | 7               | 2510                    | 10             | 50                  | 2630                    | N/A      | N/A       |
|   | n78             | 3580                    | 10             | 50                  | 3580                    | N/A      | N/A       |
|   | 1               | 1945                    | 5              | 25                  | 2135                    | N/A      | N/A       |
|   | 8               | 900                     | 5              | 25                  | 945                     | N/A      | N/A       |
|   | n78             | 3745                    | 10             | 52                  | 3745                    | 14.9     | IMD3      |
|   | 1               | 1940                    | 5              | 25                  | 2130                    | N/A      | N/A       |
| DC_1A-3A_n79A                                     | 8               | 895                     | 5              | 25                  | 940                     | 3.3      | IMD5      |
|   | n78             | 3380                    | 10             | 52                  | 3330                    | N/A      | N/A       |
|   | 1               | 1950                    | 5              | 25                  | 2140                    | 3.6      | IMD5      |
| DC_1A-18A_n77A                                    | 3               | 1750                    | 5              | 25                  | 1845                    | N/A      | N/A       |
|   | n79             | 4860                    | 40             | 216                 | 4860                    | N/A      | N/A       |
|   | 1               | N/A                     | N/A            | N/A                 | N/A                     | N/A      | N/A       |
|   | 18              | N/A                     | N/A            | N/A                 | N/A                     | N/A      | IMD5      |
|   | n77             | N/A                     | N/A            | N/A                 | N/A                     | N/A      | N/A       |
|   | 1               | 1930                    | 5              | 25                  | 2120                    | 16.4     | IMD3      |
| DC_1A-18A_n78A                                    | 18              | 825                     | 5              | 25                  | 870                     | N/A      | N/A       |
|   | n77             | 3770                    | 10             | 50                  | 3770                    | N/A      | N/A       |
|   | 1               | N/A                     | N/A            | N/A                 | N/A                     | N/A      | N/A       |
|   | 18              | N/A                     | N/A            | N/A                 | N/A                     | N/A      | IMD5      |
|   | n78             | N/A                     | N/A            | N/A                 | N/A                     | N/A      | N/A       |
|   | 1               | 1930                    | 5              | 25                  | 2120                    | 16.4     | IMD3      |
| DC_1A-18A_n79A                                    | 18              | 819                     | 5              | 25                  | 864                     | N/A      | N/A       |
|   | n78             | 3758                    | 10             | 50                  | 3758                    | N/A      | N/A       |
|   | 1               | 1935                    | 5              | 25                  | 2125                    | N/A      | N/A       |
|   | 18              | 822.5                   | 5              | 25                  | 867.5                   | 18.3     | IMD3      |
| DC_1A-18A_n79A                                    | n79             | 4737.5                  | 40             | 216                 | 4737.5                  | N/A      | N/A       |
|   | 1               | 1930                    | 5              | 25                  | 2120                    | N/A      | N/A       |

| NR or E-UTRA Band / Channel bandwidth / NRB / MSD |                 |                         |                |                     |                         |          |           |
|---|-----------------|-------------------------|----------------|---------------------|-------------------------|----------|-----------|
| EN-DC Configuration                               | EUTRA / 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) | IMD order |
|   | 18              | 820                     | 5              | 25                  | 865                     | 8.9      | IMD4      |
|   | n79             | 4925                    | 40             | 216                 | 4925                    | N/A      | N/A       |
|   | 1               | 1935                    | 5              | 25                  | 2125                    | 8.1      | IMD4      |
|   | 18              | 822.5                   | 5              | 25                  | 867.5                   | N/A      | N/A       |
|   | n79             | 4592.5                  | 40             | 216                 | 4592.5                  | N/A      | N/A       |
| DC_1A-19A_n77A<br>DC_1A-19A_n78A                  | 1               | 1940                    | 5              | 25                  | 2130                    | 17.8     | IMD3      |
|   | 19              | 832.5                   | 5              | 25                  | 877.5                   | N/A      | N/A       |
|   | n77, n78        | 3795                    | 10             | 50                  | 3795                    | N/A      | N/A       |
|   | 1               | 1940                    | 5              | 25                  | 2130                    | N/A      | N/A       |
|   | 19              | 835                     | 5              | 25                  | 880                     | 5.1      | IMD5      |
| DC_1A-19A_n79A                                    | N77, n78        | 3350                    | 10             | 50                  | 3350                    | N/A      | N/A       |
|   | 1               | 1950                    | 5              | 25                  | 2140                    | N/A      | N/A       |
|   | 19              | 837.5                   | 5              | 25                  | 882.5                   | 18.3     | IMD3      |
|   | n79             | 4782.5                  | 40             | 216                 | 4782.5                  | N/A      | N/A       |
|   | 1               | 1950                    | 5              | 25                  | 2140                    | 8.1      | IMD4      |
| DC_1A-20A_n78A                                    | 19              | 837.5                   | 5              | 25                  | 882.5                   | N/A      | N/A       |
|   | n79             | 4652.5                  | 40             | 216                 | 4652.5                  | N/A      | N/A       |
|   | 1               | 1930                    | 5              | 25                  | 2120                    | 20.3     | IMD3      |
|   | 20              | 835                     | 5              | 25                  | 794                     | N/A      | N/A       |
| DC_1A-20A_n78A                                    | n78             | 3790                    | 10             | 50                  | 3790                    | N/A      | N/A       |
|   | 1               | 1950                    | 5              | 25                  | 2140                    | N/A      | N/A       |
|   | 20              | 851                     | 5              | 25                  | 810                     | 3.0      | IMD5      |
| DC_1A-21A_n77A<br>DC_1A-21A_n78<br>A              | n78             | 3330                    | 10             | 50                  | 3330                    | N/A      | N/A       |
|   | 1               | 1964.6                  | 5              | 25                  | 2154.6                  | 30.6     | IMD2      |
|   | 21              | 1450.4                  | 5              | 25                  | 1498.4                  | N/A      | N/A       |
|   | n77, n78        | 3605                    | 10             | 50                  | 3605                    | N/A      | N/A       |
|   | 1               | 1964.6                  | 5              | 25                  | 2154.6                  | 3.6      | IMD5      |
|   | 21              | 1450.4                  | 5              | 25                  | 1498.4                  | N/A      | N/A       |
|   | n77, n78        | 3647                    | 10             | 50                  | 3647                    | N/A      | N/A       |
|   | 1               | 1950                    | 5              | 25                  | 2140                    | N/A      | N/A       |
|   | 21              | 1452                    | 5              | 25                  | 1500                    | 31.5     | IMD2      |
|   | n77, n78        | 3450                    | 10             | 50                  | 3450                    | N/A      | N/A       |
| DC_1A-21A_n79A                                    | 1               | 1950                    | 5              | 25                  | 2140                    | N/A      | N/A       |
|   | 21              | 1452                    | 5              | 25                  | 1500                    | 2.9      | IMD5      |
|   | n77, n78        | 3675                    | 10             | 50                  | 3675                    | N/A      | N/A       |
| DC_1A-28A_n77A                                    | 1               | N/A                     | N/A            | N/A                 | N/A                     | N/A      | N/A       |
|   | 21              | N/A                     | N/A            | N/A                 | N/A                     | N/A      | IMD4      |
|   | n79             | N/A                     | N/A            | N/A                 | N/A                     | N/A      | N/A       |
| DC_1A-28A_n77A                                    | 1               | 1960                    | 5              | 25                  | 2150                    | 15.8     | IMD3      |
|   | 28              | 740                     | 5              | 25                  | 795                     | N/A      | N/A       |
|   | n77             | 3630                    | 10             | 50                  | 3630                    | N/A      | N/A       |
| DC_1A-28A_n77A                                    | 1               | 1960                    | 5              | 25                  | 2150                    | N/A      | N/A       |
|   | 28              | 725                     | 5              | 25                  | 780                     | 4.3      | IMD5      |
|   | n77             | 3330                    | 10             | 50                  | 3330                    | N/A      | N/A       |
| DC_1A-28A_n78A                                    | 1               | 1960                    | 5              | 25                  | 2150                    | 15.7     | IMD3      |
|   | 28              | 740                     | 5              | 25                  | 795                     | N/A      | N/A       |
|   | n78             | 3630                    | 10             | 50                  | 3630                    | N/A      | N/A       |
| DC_1A-28A_n78A                                    | 1               | 1970                    | 5              | 25                  | 2160                    | N/A      | N/A       |
|   | 28              | 739                     | 5              | 25                  | 794                     | 4.2      | IMD5      |
|   | n78             | 3352                    | 10             | 50                  | 3352                    | N/A      | N/A       |
| DC_1A_n28A-n78A                                   | 1               | 1950                    | 5              | 25                  | 2140                    | N/A      | N/A       |
|   | n28             | 733                     | 5              | 25                  | 788                     | N/A      | N/A       |
|   | n78             | 3416                    | 10             | 50                  | 3416                    | 15.7     | IMD3      |
|   | 1               | 1950                    | 5              | 25                  | 2140                    | N/A      | N/A       |
|   | n78             | 3320                    | 10             | 50                  | 3320                    | N/A      | N/A       |
| DC_1A-28A_n79A                                    | n28             | 735                     | 5              | 25                  | 790                     | 3.3      | IMD5      |
|   | 1               | 1930                    | 5              | 25                  | 2120                    | N/A      | N/A       |
|   | 28              | 733                     | 5              | 25                  | 788                     | 15.2     | IMD3      |
|   | n79             | 4648                    | 40             | 216                 | 4648                    | N/A      | N/A       |
|   | 1               | 1925                    | 5              | 25                  | 2115                    | N/A      | N/A       |
| DC_1A-28A_n79A                                    | 28              | 740                     | 5              | 25                  | 795                     | 10.0     | IMD4      |

| NR or E-UTRA Band / Channel bandwidth / NRB / MSD |                 |                         |                |                     |                         |          |           |
|---|-----------------|-------------------------|----------------|---------------------|-------------------------|----------|-----------|
| EN-DC Configuration                               | EUTRA / 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) | IMD order |
|   | n79             | 4980                    | 40             | 216                 | 4980                    | N/A      | N/A       |
|   | 1               | 1977.5                  | 5              | 25                  | 2167.5                  | 1.2      | IMD4      |
|   | 28              | 745.5                   | 5              | 25                  | 800.5                   | N/A      | N/A       |
|   | n79             | 4420                    | 40             | 216                 | 4420                    | N/A      | N/A       |
|   | 1               | 1935                    | 5              | 25                  | 2125                    | 4.5      | IMD5      |
|   | 28              | 718                     | 5              | 25                  | 773                     | N/A      | N/A       |
|   | n79             | 4807                    | 40             | 216                 | 4807                    | N/A      | N/A       |
| DC_1A-41A_n77A                                    | 1               | 1970                    | 5              | 25                  | 2160                    | N/A      | N/A       |
|   | n77             | 3400                    | 10             | 50                  | 3400                    | N/A      | N/A       |
|   | 41              | 2510                    | 5              | 25                  | 2510                    | 11.0     | IMD4      |
|   | 1               | 1950                    | 5              | 25                  | 2140                    | 9.3      | IMD4      |
|   | n77             | 3710                    | 10             | 50                  | 3710                    | N/A      | N/A       |
|   | 41              | 2640                    | 5              | 25                  | 2640                    | N/A      | N/A       |
|   | 1               | 1930                    | 5              | 25                  | 2120                    | N/A      | N/A       |
| DC_1A-41A_n78A                                    | n77             | 4150                    | 10             | 50                  | 4150                    | N/A      | N/A       |
|   | 41              | 2510                    | 5              | 25                  | 2510                    | 3.6      | IMD5      |
|   | 1               | 1950                    | 5              | 25                  | 2140                    | 9.3      | IMD4      |
|   | 41              | 2640                    | 5              | 25                  | 2640                    | N/A      | N/A       |
|   | n78             | 3710                    | 10             | 50                  | 3710                    | N/A      | N/A       |
|   | 1               | 1975                    | 5              | 25                  | 2165                    | N/A      | N/A       |
| DC_1A-41A_n78A                                    | 41              | 2515                    | 5              | 25                  | 2515                    | 12       | IMD4      |
|   | n78             | 3410                    | 10             | 50                  | 3410                    | N/A      | N/A       |
|   | 1               | 1955                    | 5              | 25                  | 2145                    | 8.7      | IMD4      |
| DC_1A-41A_n78A                                    | 41              | 2507.5                  | 10             | 50                  | 2507.5                  | N/A      | N/A       |
|   | n78             | 3580                    | 10             | 50                  | 3580                    | N/A      | N/A       |
|   | 1               | 1970                    | 5              | 25                  | 2160                    | N/A      | N/A       |
| DC_1A-41A_n79A                                    | n79             | 4500                    | 40             | 216                 | 4500                    | N/A      | N/A       |
|   | 41              | 2530                    | 5              | 25                  | 2530                    | 29.4     | IMD2      |
|   | 1               | 1977.5                  | 5              | 25                  | 2167.5                  | N/A      | N/A       |
| DC_1A-42A_n79A                                    | n79             | 4420                    | 40             | 216                 | 4420                    | N/A      | N/A       |
|   | 42              | 3490                    | 5              | 25                  | 3490                    | 4.8      | IMD5      |
|   | 42              | 3402.5                  | 5              | 25                  | 3402.5                  | N/A      | N/A       |
|   | n79             | 4640                    | 40             | 216                 | 4640                    | N/A      | N/A       |
|   | 1               | 1975                    | 5              | 25                  | 2165                    | 15.5     | IMD3      |
|   | 42              | 3450                    | 5              | 25                  | 3450                    | N/A      | N/A       |
|   | n79             | 4520                    | 40             | 216                 | 4520                    | N/A      | N/A       |
|   | 1               | 1950                    | 5              | 25                  | 2140                    | 9.3      | IMD4      |
|   | 1               | 1950                    | 5              | 25                  | 2140                    | N/A      | N/A       |
| DC_1A_n78A-n79A                                   | n78             | 3410                    | 10             | 50                  | 3410                    | N/A      | N/A       |
|   | n79             | 4870                    | 40             | 216                 | 4870                    | 15.9     | IMD3      |
|   | 1               | 1950                    | 5              | 25                  | 2140                    | N/A      | N/A       |
|   | n79             | 4670                    | 40             | 216                 | 4670                    | N/A      | N/A       |
|   | n78             | 3490                    | 10             | 50                  | 3490                    | 4.6      | IMD5      |
|   | 2               | N/A                     | N/A            | N/A                 | N/A                     | N/A      | IMD4      |
| DC_2A-12A_n66A                                    | 12              | N/A                     | N/A            | N/A                 | N/A                     | N/A      | N/A       |
|   | n66             | N/A                     | N/A            | N/A                 | N/A                     | N/A      | N/A       |
|   | 3               | N/A                     | N/A            | N/A                 | N/A                     | N/A      | IMD3      |
| DC_3A-5A_n78A                                     | 5               | N/A                     | N/A            | N/A                 | N/A                     | N/A      | N/A       |
|   | n78             | N/A                     | N/A            | N/A                 | N/A                     | N/A      | N/A       |
|   | 3               | 1712.5                  | 5              | 25                  | 1807.5                  | N/A      | N/A       |
| DC_3A-7A_n28A                                     | n28             | 743                     | 5              | 25                  | 798                     | N/A      | N/A       |
|   | 7               | 2562                    | 10             | 50                  | 2682                    | 16.9     | IMD3      |
|   | 7               | 2543                    | 10             | 50                  | 2663                    | N/A      | N/A       |
|   | n28             | 710.5                   | 5              | 25                  | 765.5                   | N/A      | N/A       |
|   | 3               | 1737.5                  | 5              | 25                  | 1832.5                  | 26.0     | IMD2      |
|   | 3               | 1725                    | 5              | 25                  | 1820                    | 17.6     | IMD3      |
| DC_3A-7A_n78A<br>DC_3C-7A_n78A<br>DC_3C-7C_n78A   | 7               | 2565                    | 5              | 25                  | 2685                    | N/A      | N/A       |
|   | n78             | 3310                    | 10             | 50                  | 3310                    | N/A      | N/A       |
|   | 3               | 1725                    | 5              | 25                  | 1820                    | 8.6      | IMD4      |

| NR or E-UTRA Band / Channel bandwidth / NRB / MSD |                 |                         |                |                     |                         |          |                   |
|---|-----------------|-------------------------|----------------|---------------------|-------------------------|----------|-------------------|
| EN-DC Configuration                               | EUTRA / 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) | IMD order         |
|   | 7               | 2565                    | 5              | 25                  | 2685                    | N/A      | N/A               |
|   | n78             | 3475                    | 10             | 50                  | 3475                    | N/A      | N/A               |
| DC_3A-8A_n78A                                     | 8               | 910                     | 5              | 25                  | 955                     | N/A      | N/A               |
|   | n78             | 3640                    | 10             | 50                  | 3640                    | N/A      | N/A               |
|   | 3               | 1725                    | 5              | 25                  | 1820                    | 16.5     | IMD3              |
| DC_3A-19A_n77A<br>DC_3A-19A_n78A                  | 3               | 1775                    | 5              | 25                  | 1850                    | 17.3     | IMD3              |
|   | 19              | 835                     | 5              | 25                  | 880                     | N/A      | N/A               |
|   | N77, n78        | 3520                    | 10             | 50                  | 3520                    | N/A      | N/A               |
| DC_3A-19A_n79A                                    | 3               | 1775                    | 5              | 25                  | 1870                    | N/A      | N/A               |
|   | 19              | 840                     | 5              | 25                  | 885                     | 18.5     | IMD3              |
|   | n79             | 4435                    | 40             | 216                 | 4435                    | N/A      | N/A               |
|   | 3               | 1782.5                  | 5              | 25                  | 1877.5                  | 0.2      | IMD4              |
|   | 19              | 842.5                   | 5              | 25                  | 887.5                   | N/A      | N/A               |
|   | n79             | 4420                    | 40             | 216                 | 4420                    | N/A      | N/A               |
| DC_3A-20A_n28A                                    | 20              | 852                     | 5              | 25                  | 811                     | N/A      | N/A               |
|   | n28             | 728                     | 5              | 25                  | 783                     | N/A      | N/A               |
|   | 3               | 1733                    | 5              | 25                  | 1828                    | 9.4      | IMD4              |
| DC_3A-20A_n78A<br>DC_3C-20A_n78A                  | 3               | 1725                    | 5              | 25                  | 1820                    | 17.3     | IMD3              |
|   | 20              | 845                     | 5              | 25                  | 804                     | N/A      | N/A               |
|   | n78             | 3510                    | 10             | 50                  | 3510                    | N/A      | N/A               |
| DC_3A-21A_n77A<br>DC_3A-21A_n78A                  | 3               | 1767.5                  | 5              | 25                  | 1862.5                  | N/A      | N/A               |
|   | 21              | 1459.5                  | 5              | 25                  | 1507.5                  | 8.8      | IMD4 <sup>2</sup> |
|   | n77, n78        | 3795                    | 10             | 50                  | 3795                    | N/A      | N/A               |
|   | 3               | 1767.5                  | 5              | 25                  | 1862.5                  | 30.8     | IMD2              |
|   | 21              | 1459.5                  | 5              | 25                  | 1507.5                  | N/A      | N/A               |
|   | N77, n78        | 3322                    | 10             | 50                  | 3322                    | N/A      | N/A               |
| DC_3A-21A_n77A                                    | 3               | 1771.6                  | 5              | 25                  | 1866.6                  | 3.4      | IMD5              |
|   | 21              | 1450.4                  | 5              | 25                  | 1498.4                  | N/A      | N/A               |
|   | n77             | 3935                    | 10             | 50                  | 3935                    | N/A      | N/A               |
| DC_3A-21A_n79A                                    | 3               | N/A                     | N/A            | N/A                 | N/A                     | N/A      | N/A               |
|   | 21              | N/A                     | N/A            | N/A                 | N/A                     | N/A      | IMD3              |
|   | n79             | N/A                     | N/A            | N/A                 | N/A                     | N/A      | N/A               |
|   | 3               | 1774.2                  | 5              | 25                  | 1869.2                  | 17.8     | IMD3              |
|   | 21              | 1450.4                  | 5              | 25                  | 1498.4                  | N/A      | N/A               |
|   | n79             | 4770                    | 40             | 216                 | 4770                    | N/A      | N/A               |
| DC_3A-28A_n77A                                    | 3               | 1712.5                  | 5              | 25                  | 1807.5                  | N/A      | N/A               |
|   | 28              | 715                     | 5              | 25                  | 770                     | 15.3     | IMD3              |
|   | n77             | 4195                    | 10             | 50                  | 4195                    | N/A      | N/A               |
|   | 3               | 1755                    | 5              | 25                  | 1850                    | 17.0     | IMD3              |
|   | 28              | 735                     | 5              | 25                  | 790                     | N/A      | N/A               |
|   | n77             | 3320                    | 10             | 50                  | 3320                    | N/A      | N/A               |
| DC_3A-28A_n78A                                    | 3               | 1775                    | 5              | 25                  | 1870                    | 17.3     | IMD3              |
|   | 28              | 740                     | 5              | 25                  | 760                     | N/A      | N/A               |
|   | n78             | 3350                    | 10             | 25                  | 3350                    | N/A      | N/A               |
| DC_3A-28A_n79A                                    | 3               | 1770                    | 5              | 25                  | 1865                    | N/A      | N/A               |
|   | 28              | 725                     | 5              | 25                  | 780                     | 10.3     | IMD4              |
|   | n79             | 4530                    | 40             | 216                 | 4530                    | N/A      | N/A               |
|   | 3               | 1775                    | 5              | 25                  | 1870                    | 5.7      | IMD5              |
|   | 28              | 725                     | 5              | 25                  | 780                     | N/A      | N/A               |
|   | n79             | 4770                    | 40             | 216                 | 4770                    | N/A      | N/A               |
| DC_3A_n28A-n78A                                   | 3               | 1750                    | 5              | 25                  | 1845                    | N/A      | N/A               |
|   | n28             | 743                     | 5              | 25                  | 798                     | N/A      | N/A               |
|   | n78             | 3764                    | 10             | 50                  | 3764                    | 4.5      | IMD5              |
| DC_3A-41A_n78A                                    | 41              | 2620                    | 5              | 25                  | 2620                    | N/A      | N/A               |
|   | n78             | 3400                    | 10             | 50                  | 3400                    | N/A      | N/A               |
|   | 3               | 1745                    | 5              | 25                  | 1840                    | 16.4     | IMD3              |
| DC_3A_n78A-n79A                                   | 3               | 1770                    | 5              | 25                  | 1865                    | N/A      | N/A               |
|   | n78             | 3340                    | 10             | 50                  | 3340                    | N/A      | N/A               |
|   | n79             | 4910                    | 40             | 216                 | 4910                    | 16.3     | IMD3              |

| NR or E-UTRA Band / Channel bandwidth / NRB / MSD |                 |                         |                |                     |                         |          |            |
|---|-----------------|-------------------------|----------------|---------------------|-------------------------|----------|------------|
| EN-DC Configuration                               | EUTRA / 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) | IMD order  |
|   | 3               | 1770                    | 5              | 25                  | 1865                    | N/A      | N/A        |
|   | n79             | 4510                    | 40             | 216                 | 4510                    | N/A      | N/A        |
|   | n78             | 3710                    | 10             | 50                  | 3710                    | 4.2      | IMD5       |
| DC_3A-SUL_n78A-n82A                               | 3               | 1775                    | 5              | 25                  | 1870                    | 4        | IMD4       |
|   | n82             | 840                     | 5              | 25                  |                         | N/A      | N/A        |
| DC_3A-21A_n79A                                    | 3               | 1774.2                  | 5              | 25                  | 1869.2                  | 17.8     | IMD3       |
|   | 21              | 1450.4                  | 5              | 25                  | 1498.4                  | N/A      | N/A        |
|   | n79             | 4770                    | 40             | 216                 | 4770                    | N/A      | N/A        |
| DC_5A-7A_n78A                                     | 5               | 844                     | 5              | 25                  | 889                     | N/A      | N/A        |
|   | 7               | 2525                    | 5              | 25                  | 2645                    | 30.1     | IMD2       |
|   | n78             | 3489                    | 10             | 50                  | 3489                    | N/A      | N/A        |
|   | 5               | 834                     | 5              | 25                  | 879                     | 30.2     | IMD2       |
|   | 7               | 2550                    | 5              | 25                  | 2670                    | N/A      | N/A        |
|   | n78             | 3429                    | 10             | 50                  | 3429                    | N/A      | N/A        |
|   | 5               | 830                     | 5              | 25                  | 875                     | 3.3      | IMD5       |
|   | 7               | 2525                    | 5              | 25                  | 2645                    | N/A      | N/A        |
| DC_5A-41A_n78A                                    | n78             | 3350                    | 10             | 50                  | 3350                    | N/A      | N/A        |
|   | 5               | 860                     | 5              | 25                  | 885                     | 30.2     | IMD2       |
|   | 41              | 2615                    | 5              | 25                  | 2615                    | N/A      | N/A        |
|   | n78             | 3500                    | 10             | 50                  | 3500                    | N/A      | N/A        |
|   | 5               | 856.5                   | 5              | 25                  | 881.5                   | 3.1      | IMD5       |
| DC_7A-20A_n28A                                    | 41              | 2620.5                  | 5              | 25                  | 2620.5                  | N/A      | N/A        |
|   | n78             | 3490                    | 10             | 50                  | 3490                    | N/A      | N/A        |
|   | 20              | 842                     | 5              | 25                  | 801                     | N/A      | N/A        |
| DC_7A-20A_n28A                                    | n28             | 728                     | 5              | 25                  | 783                     | N/A      | N/A        |
|   | 7               | 2520                    | 10             | 50                  | 2640                    | 5.9      | IMD5       |
| DC_7A-20A_n78A                                    | 7               | 2560                    | 5              | 25                  | 2680                    | N/A      | N/A        |
|   | 20              | 851                     | 5              | 25                  | 810                     | 30.5     | IMD2       |
|   | n78             | 3370                    | 10             | 50                  | 3370                    | N/A      | N/A        |
| DC_7A-20A_n78A                                    | 7               | 2560                    | 5              | 25                  | 2680                    | N/A      | N/A        |
|   | 20              | 851                     | 5              | 25                  | 810                     | 3.0      | IMD5       |
|   | n78             | 3435                    | 10             | 50                  | 3435                    | N/A      | N/A        |
| DC_7A-20A_n78A                                    | 7               | 2555                    | 5              | 25                  | 2675                    | 30.8     | IMD2       |
|   | 20              | 845                     | 5              | 25                  | 804                     | N/A      | N/A        |
|   | n78             | 3520                    | 10             | 50                  | 3520                    | N/A      | N/A        |
| DC_7A-28A_n78A                                    | 7               | 2567.5                  | 5              | 25                  | 2687.5                  | N/A      | N/A        |
|   | 28              | 727.5                   | 5              | 25                  | 782.5                   | 28.8     | IMD2       |
|   | n78             | 3350                    | 10             | 50                  | 3350                    | N/A      | N/A        |
|   | 7               | 2567.5                  | 5              | 25                  | 2687.5                  | N/A      | N/A        |
|   | 28              | 727.5                   | 5              | 25                  | 782.5                   | 3.0      | IMD5       |
|   | n78             | 3460                    | 10             | 50                  | 3460                    | N/A      | N/A        |
|   | 7               | 2530                    | 5              | 25                  | 2650                    | 30.5     | IMD2       |
|   | 28              | 740                     | 5              | 25                  | 795                     | N/A      | N/A        |
| n78   | 3390            | 10                      | 50             | 3390                | N/A                     | N/A      |            |
| DC_7A_n28A-n78A                                   | 7               | 2565                    | 5              | 25                  | 2685                    | N/A      | N/A        |
|   | n28             | 745                     | 5              | 25                  | 800                     | N/A      | N/A        |
|   | n78             | 3310                    | 10             | 50                  | 3310                    | 29.7     | IMD2       |
|   | 7               | 2565                    | 5              | 25                  | 2685                    | N/A      | N/A        |
|   | n78             | 3365                    | 10             | 50                  | 3365                    | N/A      | N/A        |
| DC_7A-46A_n78A <sup>6</sup>                       | n28             | 745                     | 5              | 25                  | 800                     | 28.8     | IMD2       |
|   | 7               | N/A                     | N/A            | N/A                 | N/A                     | N/A      | N/A        |
|   | 46              | N/A                     | N/A            | N/A                 | N/A                     | N/A      | IMD2, IMD5 |
| DC_18A-28A_n77A                                   | n78             | N/A                     | N/A            | N/A                 | N/A                     | N/A      | N/A        |
|   | 18              | 820                     | 5              | 25                  | 865                     | N/A      | N/A        |
| DC_18A-28A_n77A                                   | 28              | 723                     | 5              | 25                  | 778                     | 4.4      | IMD5       |

| NR or E-UTRA Band / Channel bandwidth / NRB / MSD |                 |                         |                |                     |                         |          |           |
|---|-----------------|-------------------------|----------------|---------------------|-------------------------|----------|-----------|
| EN-DC Configuration                               | EUTRA / 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) | IMD order |
|   | n77             | 4058                    | 10             | 50                  | 4058                    | N/A      | N/A       |
| DC_18A-28A_n77A                                   | 18              | 820                     | 5              | 25                  | 865                     | 3.9      | IMD5      |
|   | 28              | 723                     | 5              | 25                  | 778                     | N/A      | N/A       |
|   | n77             | 3757                    | 10             | 50                  | 3757                    | N/A      | N/A       |
| DC_18A-28A_n78A                                   | 18              | 819                     | 5              | 25                  | 864                     | 3.8      | IMD5      |
|   | 28              | 723                     | 5              | 25                  | 778                     | N/A      | N/A       |
|   | n78             | 3756                    | 10             | 50                  | 3756                    | N/A      | N/A       |
| DC_19A-21A_n77A<br>DC_19A-21A_n78A                | 19              | 837.5                   | 5              | 25                  | 882.5                   | 18.7     | IMD3      |
|   | 21              | 1450.4                  | 5              | 25                  | 1498.4                  | N/A      | N/A       |
|   | n77, n78        | 3783.3                  | 10             | 50                  | 3783.3                  | N/A      | N/A       |
|   | 19              | 837.5                   | 5              | 25                  | 882.5                   | 13.2     | IMD4      |
|   | 21              | 1450.4                  | 5              | 25                  | 1498.4                  | N/A      | N/A       |
| DC_19A-21A_n77A                                   | n77, n78        | 3468.7                  | 10             | 50                  | 3468.7                  | N/A      | N/A       |
|   | 19              | 837.5                   | 5              | 25                  | 882.5                   | N/A      | N/A       |
|   | 21              | 1454.5                  | 5              | 25                  | 1502.5                  | 9.0      | IMD4      |
| DC_19A-21A_n79A                                   | n77             | 4015                    | 10             | 50                  | 4015                    | N/A      | N/A       |
|   | 19              | N/A                     | N/A            | N/A                 | N/A                     | N/A      | IMD5      |
|   | 21              | N/A                     | N/A            | N/A                 | N/A                     | N/A      | N/A       |
| DC_19A-21A_n79A                                   | n79             | N/A                     | N/A            | N/A                 | N/A                     | N/A      | N/A       |
|   | 19              | 837.5                   | 5              | 25                  | 882.2                   | N/A      | N/A       |
|   | 21              | 1452                    | 5              | 25                  | 1500                    | 3.8      | IMD5      |
|   | n79             | 4850                    | 40             | 216                 | 4850                    | N/A      | N/A       |
|   | 21              | 1452                    | 5              | 25                  | 1500                    | N/A      | N/A       |
| DC_21A-28A_n77A                                   | 28              | 730.5                   | 5              | 25                  | 785.5                   | 16.9     | IMD3      |
|   | n77             | 3689.5                  | 10             | 50                  | 3689.5                  | N/A      | N/A       |
|   | 21              | 1450.5                  | 5              | 25                  | 1498.5                  | 9.9      | IMD4      |
|   | 28              | 730.5                   | 5              | 25                  | 785.5                   | N/A      | N/A       |
|   | n77             | 3690                    | 10             | 50                  | 3690                    | N/A      | N/A       |
| DC_21A-28A_n79A                                   | 21              | 1450                    | 5              | 25                  | 1498                    | 5.2      | IMD5      |
|   | 28              | 730.5                   | 5              | 25                  | 785.5                   | N/A      | N/A       |
|   | n79             | 4420                    | 40             | 216                 | 4420                    | N/A      | N/A       |
| DC_28A-42A_79A                                    | 28              | 730                     | 5              | 25                  | 785                     | N/A      | N/A       |
|   | 42              | 3420                    | 5              | 25                  | 3420                    | 15.3     | IMD3      |
|   | n79             | 4880                    | 40             | 216                 | 4880                    | N/A      | N/A       |
|   | 28              | 745                     | 5              | 25                  | 800                     | 16.2     | IMD2      |
|   | 42              | 3597.5                  | 5              | 25                  | 3597.5                  | N/A      | N/A       |
|   | n79             | 4420                    | 40             | 216                 | 4420                    | N/A      | N/A       |
| DC_19A_n78A-n79A                                  | 19              | 835                     | 5              | 25                  | 880                     | N/A      | N/A       |
|   | n78             | 3680                    | 10             | 50                  | 3680                    | N/A      | N/A       |
|   | n79             | 4515                    | 40             | 216                 | 4515                    | 29.3     | IMD2      |
|   | 19              | 835                     | 5              | 25                  | 880                     | N/A      | N/A       |
|   | n79             | 4550                    | 40             | 216                 | 4550                    | N/A      | N/A       |
|   | n78             | 3715                    | 10             | 50                  | 3715                    | 28.8     | IMD2      |
| DC_20A_n28A-n78A,<br>DC_20A_SUL_n78A-n83A         | 20              | 857                     | 5              | 25                  | 816                     | N/A      | N/A       |
|   | n28, n83        | 743                     | 5              | 25                  | 798                     | N/A      | N/A       |
|   | n78             | 3314                    | 10             | 50                  | 3314                    | 8.7      | IMD4      |
|   | 20              | 837                     | 5              | 25                  | 796                     | N/A      | N/A       |
|   | n78             | 3310                    | 10             | 50                  | 3310                    | N/A      | N/A       |
| DC_21A_n78A-n79A                                  | n28             | 744                     | 5              | 25                  | 799                     | 9.4      | IMD4      |
|   | 21              | 1453                    | 5              | 25                  | 1501                    | N/A      | N/A       |
|   | n78             | 3420                    | 10             | 50                  | 3420                    | N/A      | N/A       |
|   | n79             | 4873                    | 40             | 216                 | 4873                    | 30.1     | IMD2      |
|   | 21              | 1453                    | 5              | 25                  | 1501                    | N/A      | N/A       |
|   | n79             | 4940                    | 40             | 216                 | 4940                    | N/A      | N/A       |
|   | n78             | 3487                    | 10             | 50                  | 3487                    | 29.8     | IMD2      |

NOTE 1: For NR band, UL/DL BW and UL L<sub>CRB</sub> can be adjusted according to the supported BW and lowest SCS supported by the UE.

NOTE 2: This band is subject to IMD5 also which MSD is not specified.

7.3B.2.3.5.3 Void

7.3B.2.3.6 Reference sensitivity exceptions due to Tx non-linearity interference in 1<sup>st</sup> or 2<sup>nd</sup> adjacent channel of UL band for EN-DC in NR FR1

Sensitivity degradation is allowed for a band if it is impacted by Tx non-linearity interference in 1<sup>st</sup> or 2<sup>nd</sup> adjacent channel from another UL band part of the same EN-DC configuration. Reference sensitivity exceptions for the victim band (DL band) are specified in Table 7.3B.2.3.6-1 with uplink configuration of the aggressor band (UL band) specified in Table 7.3B.2.3.6-1.

**Table 7.3B.2.3.6-1: Reference sensitivity exceptions (MSD) due to Tx non-linearity interference in 1<sup>st</sup> or 2<sup>nd</sup> adjacent channel of UL band for EN-DC in NR FR1**

| UL band  | DL band | SCS of UL band (kHz) | L <sub>CRB</sub> of UL band | Applicable UL BW(MHz) | MSD value of DL band (dB) | The adjacent channel of UL band  |
|--|---------|----------------------|-----------------------------|-----------------------|---------------------------|----------------------------------|
| n40  | 1       | 30                   | 25                          | ≥ 70                  | 21.5                      | 2 <sup>nd</sup> adjacent channel |
| NOTE 1: For interference in 2 <sup>nd</sup> adjacent channel, the MSD exceptions are applicable to the case that interference located in 2 <sup>nd</sup> adjacent channel of UL band falls into the DL channels. (The victim frequency of DL band can be expressed as $f_{DL} = F_{C\_UL} + 5(f_{UL} - F_{C\_UL})$ , where $F_{C\_UL}$ is the centre frequency of UL channel and $f_{UL}$ is the allocated transmission frequency of UL band). |         |                      |                             |                       |                           |                                  |

7.3B.2.3a Inter-band NE-DC within FR1

Reference sensitivity exceptions are specified for the condition when there is uplink transmission only in the aggressor band. This clause addresses directly only NE-DC configurations that don't have a corresponding specified EN-DC configuration or specific NE-DC exceptions.

7.3B.2.3a.1 Reference sensitivity exceptions due to UL harmonic interference for NE-DC in NR FR1

Sensitivity degradation is allowed for a band if it is impacted by UL harmonic interference from another band part of the same NE-DC configuration. For the NE-DC configurations that have an EN-DC defined configuration, the reference sensitivity exceptions for the victim band (high) are specified in Table 7.3B.2.3.1-1 with uplink configuration of the aggressor band (low) specified in Table 7.3B.2.3.1-2 are applicable.

7.3B.2.4 Inter-band EN-DC including FR2

7.3B.2.4.1 Void

7.3B.2.5 Inter-band EN-DC including both FR1 and FR2

7.3B.2.5.1 Reference sensitivity exceptions due to UL harmonic interference for EN-DC including both FR1 and FR2

For inter-band EN-DC of E-UTRA and NR in both FR1 and FR2, the UE is allowed to apply each sensitivity degradation for EN-DC in FR1 specified in clause 7.3B.2.3 TS 38.101-3 and for EN-DC including FR2 specified in clause 7.3B.2.3 of TS 38.101-3 independently.

7.3B.3  $\Delta R_{IB,c}$ ,  $\Delta R_{IBNC}$  for DC

7.3B.3.0 General

For the UE which supports inter-band EN-DC or NE-DC configuration, the minimum requirement for reference sensitivity in Table 7.3.1-1 and Table 7.3.1-1a in TS 36.101 [4], clause 7.3.2, 7.3A.2, 7.3C.2 in TS 38.101-1 [2] and clause 7.3.2, 7.3A.2 in TS 38.101-2 [3] shall be increased by the amount given in  $\Delta R_{IB,c}$ ,  $\Delta R_{IBNC}$  in Tables below where



unless otherwise stated, the same  $\Delta R_{IB,c}$ ,  $\Delta R_{IBNC}$  are applicable to NR band(s) part for DC configurations which have the same NR operating band combination. Unless otherwise stated,  $\Delta R_{IB,c}$  or  $\Delta R_{IBNC}$  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 TS 38.101-1 [2] and 7.3A, 7.3B in this specification, 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 TS 38.101-1 [2] and 7.3A, 7.3B in this specification for the applicable operating bands.

Unless  $\Delta R_{IB,c}$  is specified for the NE-DC configuration, the specified  $\Delta R_{IB,c}$  for the EN-DC configuration including same bands as the corresponding NE-DC configuration is applicable for the NE-DC configuration.

7.3B.3.1 Intra-band contiguous EN-DC

7.3B.3.2 Intra-band non-contiguous EN-DC

**Table 7.3B.3.2-1: Intra-band non-contiguous EN-DC with one uplink configuration on E-UTRA for reference sensitivity**

| DC configuration | Aggregated channel bandwidth |                            | $W_{gap}$ / (MHz)          | UL E-UTRA allocation | $\Delta R_{IBNC}$ (dB) | Duplex mode |
|------------------|------------------------------|----------------------------|----------------------------|----------------------|------------------------|-------------|
|                  | E-UTRA                       | NR                         |                            |                      |                        |             |
| DC_3A_n3A        | 5 MHz                        | 5 MHz                      | $45.0 < W_{gap} \leq 65.0$ | $12^1$               | 4.7                    | FDD         |
|                  |                              |                            | $0.0 < W_{gap} \leq 45.0$  | $25^1$               | 0                      |             |
|                  | 5 MHz                        | 10 MHz                     | $40.0 < W_{gap} \leq 60.0$ | $12^1$               | 3.8                    |             |
|                  |                              |                            | $0.0 < W_{gap} \leq 40.0$  | $25^1$               | 0                      |             |
|                  | 5 MHz                        | 15 MHz                     | $35.0 < W_{gap} \leq 55.0$ | $12^1$               | 3.6                    |             |
|                  |                              |                            | $0.0 < W_{gap} \leq 35.0$  | $25^1$               | 0                      |             |
|                  | 5 MHz                        | 20 MHz                     | $30.0 < W_{gap} \leq 50.0$ | $12^1$               | 3.4                    |             |
|                  |                              |                            | $0.0 < W_{gap} \leq 30.0$  | $25^1$               | 0                      |             |
|                  | 5 MHz                        | 25 MHz                     | $25.0 < W_{gap} \leq 45.0$ | $12^1$               | 3.2                    |             |
|                  |                              |                            | $0.0 < W_{gap} \leq 25.0$  | $25^1$               | 0                      |             |
|                  | 5 MHz                        | 30 MHz                     | $20.0 < W_{gap} \leq 40.0$ | $12^1$               | 3.0                    |             |
|                  |                              |                            | $0.0 < W_{gap} \leq 20.0$  | $25^1$               | 0                      |             |
|                  | 10 MHz                       | 5 MHz                      | $30.0 < W_{gap} \leq 60.0$ | $12^5$               | 5.1                    |             |
|                  |                              |                            | $0.0 < W_{gap} \leq 30.0$  | $32^1$               | 0                      |             |
|                  | 10 MHz                       | 10MHz                      | $25.0 < W_{gap} \leq 55.0$ | $12^5$               | 4.3                    |             |
|                  |                              |                            | $0.0 < W_{gap} \leq 25.0$  | $32^1$               | 0                      |             |
|                  | 10 MHz                       | 15 MHz                     | $20.0 < W_{gap} \leq 50.0$ | $12^5$               | 3.8                    |             |
|                  |                              |                            | $0.0 < W_{gap} \leq 20.0$  | $32^1$               | 0                      |             |
|                  | 10 MHz                       | 20 MHz                     | $15.0 < W_{gap} \leq 45.0$ | $12^5$               | 3.5                    |             |
|                  |                              |                            | $0.0 < W_{gap} \leq 15.0$  | $32^1$               | 0                      |             |
|                  | 10 MHz                       | 25 MHz                     | $10.0 < W_{gap} \leq 40.0$ | $12^5$               | 3.2                    |             |
|                  |                              |                            | $0.0 < W_{gap} \leq 10.0$  | $32^1$               | 0                      |             |
|                  | 10 MHz                       | 30 MHz                     | $5.0 < W_{gap} \leq 35.0$  | $12^5$               | 2.8                    |             |
|                  |                              |                            | $0.0 < W_{gap} \leq 5.0$   | $32^1$               | 0                      |             |
|                  | 15 MHz                       | 5 MHz                      | $25.0 < W_{gap} \leq 55.0$ | $12^6$               | 6.0                    |             |
|                  |                              |                            | $0.0 < W_{gap} \leq 25.0$  | $32^1$               | 0                      |             |
|                  | 15 MHz                       | 10 MHz                     | $20.0 < W_{gap} \leq 50.0$ | $12^6$               | 4.7                    |             |
|                  |                              |                            | $0.0 < W_{gap} \leq 20.0$  | $32^1$               | 0                      |             |
|                  | 15 MHz                       | 15 MHz                     | $15.0 < W_{gap} \leq 45.0$ | $12^6$               | 4.2                    |             |
|                  |                              |                            | $0.0 < W_{gap} \leq 15.0$  | $32^1$               | 0                      |             |
| 15 MHz           | 20 MHz                       | $10.0 < W_{gap} \leq 40.0$ | $12^6$                     | 3.8                  |                        |             |
|                  |                              | $0.0 < W_{gap} \leq 10.0$  | $32^1$                     | 0                    |                        |             |
| 15 MHz           | 25 MHz                       | $5.0 < W_{gap} \leq 35.0$  | $12^6$                     | 3.5                  |                        |             |
|                  |                              | $0.0 < W_{gap} \leq 5.0$   | $32^1$                     | 0                    |                        |             |

| DC configuration | Aggregated channel bandwidth |        | $W_{gap}$ / (MHz)          | UL E-UTRA allocation | $\Delta R_{IBNC}$ (dB) | Duplex mode |
|------------------|------------------------------|--------|----------------------------|----------------------|------------------------|-------------|
|                  | E-UTRA                       | NR     |                            |                      |                        |             |
|                  | 15 MHz                       | 30 MHz | $0.0 < W_{gap} \leq 30.0$  | 12 <sup>6</sup>      | 3.3                    |             |
|                  | 20 MHz                       | 5 MHz  | $15.0 < W_{gap} \leq 50.0$ | 16 <sup>7</sup>      | 6.5                    |             |
|                  |                              |        | $0.0 < W_{gap} \leq 15.0$  | 32 <sup>1</sup>      | 0                      |             |
|                  | 20 MHz                       | 10 MHz | $10.0 < W_{gap} \leq 45.0$ | 16 <sup>7</sup>      | 5.1                    |             |
|                  |                              |        | $0.0 < W_{gap} \leq 10.0$  | 32 <sup>1</sup>      | 0                      |             |
|                  | 20 MHz                       | 15 MHz | $5.0 < W_{gap} \leq 40.0$  | 16 <sup>7</sup>      | 4.5                    |             |
|                  |                              |        | $0.0 < W_{gap} \leq 5.0$   | 32 <sup>1</sup>      | 0                      |             |
|                  | 20 MHz                       | 20 MHz | $0.0 < W_{gap} \leq 35.0$  | 16 <sup>7</sup>      | 4.1                    |             |
|                  | 20 MHz                       | 25 MHz | $0.0 < W_{gap} \leq 30.0$  | 16 <sup>7</sup>      | 3.8                    |             |
|                  | 20 MHz                       | 30 MHz | $0.0 < W_{gap} \leq 25.0$  | 16 <sup>7</sup>      | 3.6                    |             |

- NOTE 1: UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission.
- NOTE 2:  $W_{gap}$  is the sub-block gap between the two sub-blocks.
- NOTE 3: The table only applies when the center frequency of E-UTRA carrier is higher than the NR carrier, and the  $\Delta R_{IBNC}$  applies to the NR DL carrier only
- NOTE 4: All combinations of channel bandwidths defined in Table 5.3B.1.3-1.
- NOTE 5: UL resource blocks shall be located at  $RB_{start} = 25$ .
- NOTE 6: UL resource blocks shall be located at  $RB_{start} = 35$ .
- NOTE 7: UL resource blocks shall be located at  $RB_{start} = 50$ .

### 7.3B.3.3 Inter-band EN-DC within FR1

#### 7.3B.3.3.1 $\Delta R_{IB,c}$ for EN-DC in two bands

Table 7.3B.3.3.1-1:  $\Delta R_{IB,c}$  due to EN-DC(two bands)

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta R_{IB,c}$ (dB) |
|--------------------------------|-------------------|------------------------|
| DC_1_n28                       | n28               | 0.2                    |
| DC_1_n51                       | n51               | 0.1                    |
| DC_1_n77                       | 1                 | 0.2                    |
|                                | n77               | 0.5                    |
| DC_1_n78                       | n78               | 0.5                    |
| DC_2_n66                       | 2                 | 0.3                    |
|                                | n66               | 0.3                    |
| DC_2_n78                       | 2                 | 0.2                    |
|                                | n78               | 0.5                    |
| DC_3_n51                       | 3                 | 0.2                    |
|                                | n51               | 0.2                    |
| DC_3_n77                       | 3                 | 0.2                    |
|                                | n77               | 0.5                    |
| DC_3_n78                       | 3                 | 0.2                    |
|                                | n78               | 0.5                    |
| DC_5_n78                       | 5                 | 0.2                    |
|                                | n78               | 0.5                    |
| DC_7_n51                       | n51               | 0.2                    |
| DC_7_n77                       | n77               | 0.5                    |
| DC_7_n78                       | n78               | 0.5                    |
| DC_7-7_n78                     |                   |                        |
| DC_8_n77                       | 8                 | 0.2                    |
|                                | n77               | 0.5                    |
| DC_8_n78                       | 8                 | 0.2                    |
|                                | n78               | 0.5                    |
| DC_11_n77                      | n77               | 0.5                    |
| DC_11_n78                      | n78               | 0.5                    |
| DC_12_n5                       | 12                | 0.3                    |
|                                | n5                | 0.5                    |
| DC_12_n66                      | 12                | 0.5                    |
| DC_18_n77                      | n77               | 0.5                    |

|           |     |                  |
|-----------|-----|------------------|
| DC_19_n77 | n77 | 0.5              |
| DC_19_n78 | n78 | 0.5              |
| DC_20_n51 | n51 | 0.2              |
| DC_20_n77 | n77 | 0.5              |
| DC_20_n78 | n78 | 0.5              |
| DC_21_n77 | n77 | 0.5              |
| DC_21_n78 | n78 | 0.5              |
| DC_25_n41 | n41 | 0 <sup>1</sup>   |
|           |     | 0.5 <sup>2</sup> |
| DC_26_n77 | n77 | 0.5              |
| DC_26_n78 | n78 | 0.5              |
| DC_28_n51 | n51 | 0.2              |
| DC_28_n77 | 28  | 0.2              |
|           | n77 | 0.5              |
| DC_28_n78 | 28  | 0.2              |
|           | n78 | 0.5              |
| DC_30_n66 | 30  | 0.5              |
|           | n66 | 0.4              |
| DC_38_n78 | 38  | 0.4              |
|           | n78 | 0.5              |
| DC_39_n78 | n78 | 0.5              |
| DC_39_n79 | n79 | 0.5              |
| DC_40_n77 | 40  | 0.4              |
|           | n77 | 0.5              |
| DC_41_n77 | n77 | 0.5              |
| DC_41_n78 | n78 | 0.5              |
| DC_41_n79 | n79 | 0.5              |
| DC_42_n51 | n51 | 0.2              |
| DC_66_n78 | 66  | 0.2              |
|           | n78 | 0.5              |

NOTE 1: The requirement is applied for UE transmitting on the frequency range of 2545 – 2690 MHz.  
NOTE 2: The requirement is applied for UE transmitting on the frequency range of 2496 – 2545 MHz.

7.3B.3.3.2  $\Delta R_{IB,c}$  for EN-DC three bandsTable 7.3B.3.3.2-1:  $\Delta R_{IB,c}$  due to EN-DC (three bands)

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta R_{IB,c}$ (dB) |
|--------------------------------|-------------------|------------------------|
| DC_1-3_n28                     | n28               | 0.2                    |
| DC_1-3_n77                     | 1                 | 0.2                    |
|                                | 3                 | 0.2                    |
|                                | n77               | 0.5                    |
| DC_1-3_n78                     | 1                 | 0.2                    |
|                                | 3                 | 0.2                    |
|                                | n78               | 0.5                    |
| DC_1-5_n78                     | 1                 | 0.2                    |
|                                | 5                 | 0.2                    |
|                                | n78               | 0.5                    |
| DC_1-7_n28                     | n28               | 0.2                    |
| DC_1-7_n78<br>DC_1-7-7_n78     | 1                 | 0.2                    |
|                                | 7                 | 0.2                    |
|                                | n78               | 0.5                    |
| DC_1-8_n78                     | 8                 | 0.2                    |
|                                | n78               | 0.5                    |
| DC_1-18_n77                    | n77               | 0.5                    |
| DC_1-18_n78                    | n78               | 0.5                    |
| DC_1-19_n77                    | n77               | 0.5                    |
| DC_1-19_n78                    | n78               | 0.5                    |
| DC_1-19_n79                    | 1                 | 0.3                    |
|                                | 19                | 0.3                    |
| DC_1-20_n28                    | 20                | 0.2                    |

|                          |           |     |
|--------------------------|-----------|-----|
|                          | n28       | 0.2 |
| DC_1-20_n78              | n78       | 0.5 |
| DC_1-21_n77              | n77       | 0.5 |
| DC_1-21_n78              | 1         | 0.2 |
|                          | n78       | 0.5 |
| DC_1-28_n77              | 28        | 0.2 |
|                          | n77       | 0.5 |
| DC_1-28_n78              | 28 or n28 | 0.2 |
| DC_1_n28-n78             | n78       | 0.5 |
| DC_1_n28-n79             | 1         | 0.3 |
|                          | 28        | 0.3 |
| DC_1-42_n77              | 1         | 0.2 |
|                          | 42        | 0.5 |
|                          | n77       | 0.5 |
| DC_1-41_n77              | n77       | 0.5 |
| DC_1-41_n78              | n78       | 0.5 |
| DC_1-42_n78              | 1         | 0.2 |
|                          | 42        | 0.5 |
|                          | n78       | 0.5 |
| DC_1-42_n79              | 42        | 0.5 |
| DC_1_n77-n79             | 1         | 0.2 |
|                          | n77       | 0.5 |
| DC_1_n78-n79             | n78       | 0.5 |
| DC_1-SUL_n78-n84         | n78       | 0.5 |
| DC_2_5_n66               | 2         | 0.3 |
|                          | n66       | 0.3 |
| DC_2_30_n66              | 2         | 0.4 |
|                          | 30        | 0.5 |
|                          | n66       | 0.4 |
| DC_2-66_n71B             | 2         | 0.3 |
|                          | 66        | 0.3 |
| DC_3_n3-n77              | 3         | 0.2 |
|                          | n3        | 0.2 |
|                          | n77       | 0.5 |
| DC_3_n3-n78              | 3         | 0.2 |
|                          | n3        | 0.2 |
|                          | n78       | 0.5 |
| DC_3-5_n78               | 3         | 0.2 |
|                          | 5         | 0.2 |
|                          | n78       | 0.5 |
| DC_3-7_n78, DC_3-7-7_n78 | 3         | 0.2 |
|                          | 7         | 0.2 |
|                          | n78       | 0.5 |
| DC_3-8_n78               | 3         | 0.2 |
|                          | 8         | 0.2 |
|                          | n78       | 0.5 |
| DC_3-19_n77              | 3         | 0.2 |
|                          | n77       | 0.5 |
| DC_3-19_n78              | 3         | 0.2 |
|                          | n78       | 0.5 |
| DC_3-20_n28              | 20        | 0.1 |
|                          | n28       | 0.1 |
| DC_3-20_n78              | 3         | 0.2 |
|                          | n78       | 0.5 |
| DC_3-21_n77              | 3         | 0.3 |
|                          | 21        | 0.5 |
|                          | n77       | 0.5 |
| DC_3-21_n78              | 3         | 0.3 |
|                          | 21        | 0.5 |
|                          | n78       | 0.5 |
| DC_3-21_n79              | 3         | 0.3 |
|                          | 21        | 0.5 |
| DC_3-28_n78              | 3         | 0.2 |
| DC_3_n28-n78             | n78       | 0.5 |
| DC_3-38_n78              | 3         | 0.2 |

|                   |     |                  |
|-------------------|-----|------------------|
|                   | 38  | 0.4              |
|                   | n78 | 0.5              |
| DC_3-41_n78       | 3   | 0.2              |
|                   | 41  | 0 <sup>1</sup>   |
|                   |     | 0.5 <sup>2</sup> |
|                   | n78 | 0.5              |
| DC_3-42_n77       | 3   | 0.2              |
|                   | 42  | 0.5              |
|                   | n77 | 0.5              |
| DC_3-42_n78       | 3   | 0.2              |
|                   | 42  | 0.5              |
|                   | n78 | 0.5              |
| DC_3-42_n79       | 3   | 0.2              |
|                   | 42  | 0.5              |
| DC_3_n77-n79      | 3   | 0.2              |
|                   | n77 | 0.5              |
| DC_3_n78-n79      | 3   | 0.2              |
|                   | n78 | 0.5              |
| DC_3-SUL_n78-n80  | 3   | 0.2              |
|                   | n78 | 0.5              |
| DC_3-SUL_n78-n82  | 3   | 0.2              |
|                   | n78 | 0.5              |
| DC_5-7_n78        | 5   | 0.2              |
|                   | 7   | 0.2              |
|                   | n78 | 0.5              |
| DC_5_30_n66       | 30  | 0.5              |
|                   | n66 | 0.4              |
| DC_7-20_n28       | 20  | 0.2              |
|                   | n28 | 0.2              |
| DC_7-20_n78       | n78 | 0.5              |
| DC_7-28_n78       | n78 | 0.5              |
| DC_7_n28-n78      | n78 | 0.5              |
| DC_7-46_n78       | n78 | 0.5              |
| DC_8A-SUL_n78-n81 | 8   | 0.2              |
|                   | n78 | 0.2              |
| DC_18-28_n77      | n77 | 0.5              |
| DC_18-28_n78      | n78 | 0.5              |
| DC_19-21_n77      | n77 | 0.5              |
| DC_19-21_n78      | n78 | 0.5              |
| DC_19-42_n77      | 42  | 0.5              |
|                   | n77 | 0.5              |
| DC_19-42_n78      | 42  | 0.5              |
|                   | n78 | 0.5              |
| DC_19-42_n79      | 42  | 0.5              |
| DC_19_n77-n79     | n77 | 0.5              |
| DC_19_n78-n79     | n78 | 0.5              |
| DC_20_n28-n75     | n28 | 0.2              |
| DC_20_n28-n78     | 20  | 0.2              |
|                   | n28 | 0.2              |
|                   | n78 | 0.5              |
| DC_20_n75-n78     | n78 | 0.5              |
| DC_20_n76-n78     | n78 | 0.5              |
| DC_20-SUL_n78-n82 | n78 | 0.5              |
| DC_20-SUL_n78-n83 | 20  | 0.2              |
|                   | n78 | 0.5              |
| DC_21-42_n77      | 42  | 0.5              |
|                   | n77 | 0.5              |
| DC_21-42_n78      | 42  | 0.5              |
|                   | n78 | 0.5              |
| DC_21-42_n79      | 42  | 0.5              |
| DC_21_n77-n79     | n77 | 0.5              |
| DC_21_n78-n79     | n78 | 0.5              |
| DC_28-SUL_n78-n83 | 28  | 0.2              |
|                   | n78 | 0.5              |
| DC_28-42_n77      | 28  | 0.2              |

|   |     |     |
|---|-----|-----|
|   | 42  | 0.5 |
|   | n77 | 0.5 |
| DC_28-42_n78  | 28  | 0.2 |
|   | 42  | 0.5 |
|   | n78 | 0.5 |
| DC_28-42_n79  | 28  | 0.2 |
|   | 42  | 0.5 |
| DC_41-42_n77  | 42  | 0.5 |
|   | n77 | 0.5 |
| DC_41-42_n78  | 42  | 0.5 |
|   | n78 | 0.5 |
| DC_41-42_n79  | 42  | 0.5 |
|   |     |     |
| DC_66-SUL_n78-n86   | 66  | 0.2 |
|   | n78 | 0.5 |
| NOTE 1: The requirement is applied for UE transmitting on the frequency range of 2545 – 2690 MHz. |     |     |
| NOTE 2: The requirement is applied for UE transmitting on the frequency range of 2496 – 2545 MHz. |     |     |

7.3B.3.3.3

$\Delta R_{IB,c}$  for EN-DC four bands

**Table 7.3B.3.3.3-1:  $\Delta R_{IB,c}$  due to EN-DC (four bands)**

| Inter-band EN-DC configuration  | E-UTRA or NR Band | $\Delta R_{IB,c}$ (dB) |
|---------------------------------|-------------------|------------------------|
| DC_1-3-5_n78                    | 1                 | 0.2                    |
|                                 | 3                 | 0.2                    |
|                                 | n78               | 0.5                    |
| DC_1-3-7_n28                    | n28               | 0.2                    |
| DC_1-3-7_n78<br>DC_1-3-7-7_n78  | 1                 | 0.3                    |
|                                 | 3                 | 0.3                    |
|                                 | 7                 | 0.3                    |
|                                 | n78               | 0.5                    |
| DC_1-3-8_n78                    | 1                 | 0.2                    |
|                                 | 3                 | 0.2                    |
|                                 | 8                 | 0.2                    |
|                                 | n78               | 0.5                    |
| DC_1-3-19_n78                   | 1                 | 0.2                    |
|                                 | 3                 | 0.2                    |
|                                 | n78               | 0.5                    |
| DC_1-3-20_n28                   | 20                | 0.2                    |
|                                 | n28               | 0.2                    |
| DC_1-3-20_n78                   | 1                 | 0.2                    |
|                                 | 3                 | 0.2                    |
|                                 | n78               | 0.5                    |
| DC_1-3-21_n77                   | 1                 | 0.2                    |
|                                 | 3                 | 0.3                    |
|                                 | 21                | 0.5                    |
|                                 | n77               | 0.5                    |
| DC_1-3-21_n78                   | 1                 | 0.2                    |
|                                 | 3                 | 0.3                    |
|                                 | 21                | 0.5                    |
|                                 | n78               | 0.5                    |
| DC_1-3-21_n79                   | 3                 | 0.3                    |
|                                 | 21                | 0.5                    |
| DC_1-3-28_n77                   | 1                 | 0.2                    |
|                                 | 3                 | 0.2                    |
|                                 | 28                | 0.2                    |
|                                 | n77               | 0.5                    |
| DC_1-3-28_n78<br>DC_1-3_n28-n78 | 1                 | 0.2                    |
|                                 | 3                 | 0.2                    |
|                                 | 28 or n28         | 0.2                    |
|                                 | n78               | 0.5                    |
| DC_1-3-28_n79                   | 1                 | 0.2                    |
|                                 | 3                 | 0.2                    |
|                                 | 28                | 0.2                    |

|                                |     |     |
|--------------------------------|-----|-----|
| DC_1-3-42_n77                  | 1   | 0.2 |
|                                | 3   | 0.2 |
|                                | 42  | 0.5 |
|                                | n77 | 0.5 |
| DC_1-3-42_n78                  | 1   | 0.2 |
|                                | 3   | 0.2 |
|                                | 42  | 0.5 |
|                                | n78 | 0.5 |
| DC_1-3-42_n79                  | 1   | 0.2 |
|                                | 3   | 0.2 |
|                                | 42  | 0.5 |
| DC_1-5-7_n78<br>DC_1-5-7-7_n78 | 1   | 0.2 |
|                                | 5   | 0.2 |
|                                | 7   | 0.2 |
|                                | n78 | 0.5 |
| DC_1-7-20_n28                  | 20  | 0.2 |
|                                | n28 | 0.2 |
| DC_1-7-20_n78                  | 1   | 0.2 |
|                                | 7   | 0.2 |
|                                | 20  | 0.2 |
|                                | n78 | 0.5 |
| DC_1-7_n28-n78                 | 1   | 0.2 |
|                                | 7   | 0.2 |
|                                | n28 | 0.2 |
|                                | n78 | 0.5 |
| DC_1-18-28_n77                 | n77 | 0.5 |
| DC_1-18-28_n78                 | n78 | 0.5 |
| DC_1-19-42_n77                 | 1   | 0.2 |
|                                | 42  | 0.5 |
|                                | n77 | 0.5 |
| DC_1-19-42_n78                 | 42  | 0.5 |
|                                | n78 | 0.5 |
| DC_1-19-42_n79                 | 42  | 0.5 |
| DC_1-20_n28-n78                | 20  | 0.2 |
|                                | n28 | 0.2 |
|                                | n78 | 0.5 |
| DC_1-21-42_n77                 | 1   | 0.2 |
|                                | 42  | 0.5 |
|                                | n77 | 0.5 |
| DC_1-21-42_n78                 | 42  | 0.5 |
|                                | n78 | 0.5 |
| DC_1-21-42_n79                 | 42  | 0.5 |
| DC_1-28-42_n77                 | 1   | 0.2 |
|                                | 28  | 0.2 |
|                                | 42  | 0.5 |
|                                | n77 | 0.5 |
| DC_1-28-42_n78                 | 28  | 0.2 |
|                                | 42  | 0.5 |
|                                | n78 | 0.5 |
| DC_1-28-42_n79                 | 28  | 0.2 |
|                                | 42  | 0.5 |
| DC_1-41-42_n77                 | 42  | 0.5 |
|                                | n77 | 0.5 |
| DC_1-41-42_n78                 | 42  | 0.5 |
|                                | n78 | 0.5 |
| DC_1-41-42_n79                 | 42  | 0.5 |
| DC_1-41-42_n79                 | 42  | 0.5 |
| DC_2-66-(n)71                  | 2   | 0.3 |
|                                | 66  | 0.3 |
| DC_3-5-7_n78, DC_3-5-7-7_n78   | 3   | 0.2 |
|                                | 5   | 0.2 |
|                                | 7   | 0.2 |
|                                | n78 | 0.5 |
| DC_3-7-7_n78                   | 3   | 0.2 |
|                                | 7   | 0.2 |

|                                 |           |     |
|---------------------------------|-----------|-----|
|                                 | n78       | 0.5 |
| DC_3-7-20_n28                   | 20        | 0.2 |
|                                 | n28       | 0.1 |
| DC_3-7-20_n78                   | 3         | 0.2 |
|                                 | 7         | 0.2 |
|                                 | n78       | 0.5 |
| DC_3-7-28_n78<br>DC_3-7_n28-n78 | 3         | 0.2 |
|                                 | 7         | 0.2 |
|                                 | 28 or n28 | 0.2 |
|                                 | n78       | 0.5 |
| DC_3-19-21_n77                  | 3         | 0.3 |
|                                 | 21        | 0.5 |
|                                 | n77       | 0.5 |
| DC_3-19-21_n78                  | 3         | 0.3 |
|                                 | 21        | 0.5 |
|                                 | n78       | 0.5 |
| DC_3-19-21_n79                  | 3         | 0.3 |
|                                 | 21        | 0.5 |
| DC_3-19-42_n77                  | 3         | 0.2 |
|                                 | 42        | 0.5 |
|                                 | n77       | 0.5 |
| DC_3-19-42_n78                  | 3         | 0.2 |
|                                 | 42        | 0.5 |
|                                 | n78       | 0.5 |
| DC_3-19-42_n79                  | 3         | 0.2 |
|                                 | 42        | 0.5 |
| DC_3-20_n28-n78                 | 3         | 0.2 |
|                                 | 20        | 0.2 |
|                                 | n28       | 0.2 |
|                                 | n78       | 0.5 |
| DC_3-21-42_n77                  | 3         | 0.3 |
|                                 | 21        | 0.5 |
|                                 | 42        | 0.5 |
|                                 | n77       | 0.5 |
| DC_3-21-42_n78                  | 3         | 0.3 |
|                                 | 21        | 0.5 |
|                                 | 42        | 0.5 |
|                                 | n78       | 0.5 |
| DC_3-21-42_n79                  | 3         | 0.3 |
|                                 | 21        | 0.5 |
|                                 | 42        | 0.5 |
| DC_3-28-42_n77                  | 3         | 0.2 |
|                                 | 28        | 0.2 |
|                                 | 42        | 0.5 |
|                                 | n77       | 0.5 |
| DC_3-28-42_n78                  | 3         | 0.2 |
|                                 | 28        | 0.2 |
|                                 | 42        | 0.5 |
|                                 | n78       | 0.5 |
| DC_3-28-42_n79                  | 3         | 0.2 |
|                                 | 28        | 0.2 |
|                                 | 42        | 0.5 |
| DC_5-7-7_n78                    | 5         | 0.2 |
|                                 | 7         | 0.2 |
|                                 | n78       | 0.5 |
| DC_7-20_n28-n78                 | 20        | 0.2 |
|                                 | n28       | 0.2 |
|                                 | n78       | 0.5 |
| DC_19-21-42_n77                 | 42        | 0.5 |
|                                 | n77       | 0.5 |
| DC_19-21-42_n78                 | 42        | 0.5 |
|                                 | n78       | 0.5 |
| DC_19-21-42_n79                 | 42        | 0.5 |
| DC_21-28-42_n77                 | 28        | 0.2 |
|                                 | 42        | 0.5 |



|                 |     |     |
|-----------------|-----|-----|
|                 | n77 | 0.5 |
| DC_21-28-42_n78 | 28  | 0.2 |
|                 | 42  | 0.5 |
|                 | n78 | 0.5 |
| DC_21-28-42_n79 | 28  | 0.2 |
|                 | 42  | 0.5 |

7.3B.3.3.4  $\Delta R_{IB,c}$  for EN-DC five bands

**Table 7.3B.3.3.4-1:  $\Delta R_{IB,c}$  due to EN-DC (five bands)**

| Inter-band EN-DC configuration      | E-UTRA or NR Band | $\Delta R_{IB,c}$ (dB) |
|-------------------------------------|-------------------|------------------------|
| DC_1-3-5-7_n78,<br>DC_1-3-5-7-7_n78 | 1                 | 0.2                    |
|                                     | 3                 | 0.2                    |
|                                     | 5                 | 0.2                    |
|                                     | 7                 | 0.2                    |
|                                     | n78               | 0.5                    |
| DC_1-3-7-20_n28                     | 20                | 0.2                    |
|                                     | n28               | 0.2                    |
| DC_1-3-7-20_n78                     | 1                 | 0.2                    |
|                                     | 3                 | 0.2                    |
|                                     | 7                 | 0.2                    |
|                                     | n78               | 0.5                    |
| DC_1-3-7_n28-n78                    | 1                 | 0.2                    |
|                                     | 3                 | 0.2                    |
|                                     | 7                 | 0.2                    |
|                                     | n28               | 0.2                    |
|                                     | n78               | 0.5                    |
| DC_1-3-19-21_n77                    | 1                 | 0.2                    |
|                                     | 3                 | 0.3                    |
|                                     | 21                | 0.5                    |
|                                     | n77               | 0.5                    |
| DC_1-3-19-21_n78                    | 1                 | 0.2                    |
|                                     | 3                 | 0.3                    |
|                                     | 21                | 0.5                    |
|                                     | n78               | 0.5                    |
| DC_1-3-19-21_n79                    | 3                 | 0.3                    |
|                                     | 21                | 0.5                    |
| DC_1-3-19-42_n77                    | 1                 | 0.2                    |
|                                     | 3                 | 0.2                    |
|                                     | 42                | 0.5                    |
|                                     | n77               | 0.5                    |
| DC_1-3-19-42_n78                    | 1                 | 0.2                    |
|                                     | 3                 | 0.2                    |
|                                     | 42                | 0.5                    |
|                                     | n78               | 0.5                    |
| DC_1-3-19-42_n79                    | 1                 | 0.2                    |
|                                     | 3                 | 0.2                    |
|                                     | 42                | 0.5                    |
| DC_1-3-28-42_n77                    | 1                 | 0.2                    |
|                                     | 3                 | 0.2                    |
|                                     | 28                | 0.2                    |
|                                     | 42                | 0.5                    |
|                                     | n77               | 0.5                    |
| DC_1-3-28-42_n78                    | 1                 | 0.2                    |
|                                     | 3                 | 0.2                    |
|                                     | 28                | 0.2                    |
|                                     | 42                | 0.5                    |
|                                     | n78               | 0.5                    |
| DC_1-3-28-42_n79                    | 1                 | 0.2                    |
|                                     | 3                 | 0.2                    |
|                                     | 28                | 0.2                    |
|                                     | 42                | 0.5                    |
| DC_1-3-20_n28-n78                   | 1                 | 0.2                    |

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta R_{IB,c}$ (dB) |
|--------------------------------|-------------------|------------------------|
|                                | 3                 | 0.2                    |
|                                | 20                | 0.2                    |
|                                | n28               | 0.2                    |
|                                | n78               | 0.5                    |
| DC_1-3-21-42_n77               | 1                 | 0.2                    |
|                                | 3                 | 0.3                    |
|                                | 21                | 0.5                    |
|                                | 42                | 0.5                    |
|                                | n77               | 0.2                    |
| DC_1-3-21-42_n78               | 1                 | 0.2                    |
|                                | 3                 | 0.3                    |
|                                | 21                | 0.5                    |
|                                | 42                | 0.5                    |
|                                | n78               | 0.2                    |
| DC_1-3-21-42_n79               | 1                 | 0.2                    |
|                                | 3                 | 0.3                    |
|                                | 21                | 0.5                    |
|                                | 42                | 0.5                    |
| DC_1-7-20_n28-n78              | 1                 | 0.2                    |
|                                | 7                 | 0.2                    |
|                                | 20                | 0.2                    |
|                                | n28               | 0.2                    |
|                                | n78               | 0.5                    |
| DC_1-19-21-42_n77              | 1                 | 0.2                    |
|                                | 42                | 0.5                    |
|                                | n77               | 0.5                    |
| DC_1-19-21-42_n78              | 42                | 0.5                    |
|                                | n78               | 0.5                    |
| DC_1-19-21-42_n79              | 42                | 0.5                    |
| DC_1-21-28-42_n77              | 1                 | 0.2                    |
|                                | 28                | 0.2                    |
|                                | 42                | 0.5                    |
|                                | n77               | 0.5                    |
| DC_1-21-28-42_n78              | 28                | 0.2                    |
|                                | 42                | 0.5                    |
|                                | n78               | 0.5                    |
| DC_1-21-28-42_n79              | 28                | 0.2                    |
|                                | 42                | 0.5                    |
| DC_3-7-20_n28-n78              | 3                 | 0.2                    |
|                                | 7                 | 0.2                    |
|                                | 20                | 0.2                    |
|                                | n28               | 0.2                    |

### 7.3B.3.3.5 $\Delta R_{IB,c}$ for EN-DC six bands

**Table 7.3B.3.3.5-1:  $\Delta R_{IB,c}$  due to EN-DC (six bands)**

| Inter-band EN-DC configuration | E-UTRA or NR Band | $\Delta R_{IB,c}$ (dB) |
|--------------------------------|-------------------|------------------------|
| DC_1-3-7-20_n28-n78            | 1                 | 0.2                    |
|                                | 3                 | 0.2                    |
|                                | 7                 | 0.2                    |
|                                | 20                | 0.2                    |
|                                | n28               | 0.2                    |
|                                | n78               | 0.5                    |

### 7.3B.3.3a Inter-band NE-DC within FR1

Unless  $\Delta R_{IB,c}$  is specified in this clause, the value of  $\Delta R_{IB,c}$  for the correspondingly specified EN-DC configuration in clause 7.3B.3.3 is applicable.

### 7.3B.3.4 Inter-band EN-DC including FR2

#### 7.3B.3.4.1 $\Delta R_{IB,c}$ for EN-DC in two bands

Unless otherwise stated,  $\Delta R_{IB,c}$  for E-UTRA and FR2 NR bands of inter-band EN-DC combinations defined in table 5.5B.5.1-1 is set to zero.

**Table 7.3B.3.4.1-1: Void**

#### 7.3B.3.4.2 $\Delta R_{IB,c}$ for EN-DC three bands

Unless otherwise stated,  $\Delta R_{IB,c}$  for FR2 NR bands is set to zero, and  $\Delta R_{IB,c}$  for constituent E-UTRA bands for inter-band EN-DC defined in table 5.5B.5.3-1 is the same as those for the corresponding E-UTRA CA configuration specified in TS 36.101 [4], without the FR2 NR bands.

**Table 7.3B.3.4.2-1: Void**

#### 7.3B.3.4.3 $\Delta R_{IB,c}$ for EN-DC four bands

Unless otherwise stated,  $\Delta R_{IB,c}$  for FR2 NR bands is set to zero, and  $\Delta R_{IB,c}$  for constituent E-UTRA bands for inter-band EN-DC defined in table 5.2B.5.3-1 is the same as those for the corresponding E-UTRA CA configuration specified in TS 36.101 [4], without the FR2 NR bands.

**Table 7.3B.3.4.3-1: Void**

#### 7.3B.3.4.4 $\Delta R_{IB,c}$ for EN-DC five bands

Unless otherwise stated,  $\Delta R_{IB,c}$  for FR2 NR bands is set to zero, and  $\Delta R_{IB,c}$  for constituent E-UTRA bands for inter-band EN-DC defined in table 5.5B.5.4-1 is the same as those for the corresponding E-UTRA CA configuration specified in TS 36.101 [4], without the FR2 NR bands.

**Table 7.3B.3.4.4-1: Void**

#### 7.3B.3.4.5 Void

### 7.3B.3.5 Inter-band EN-DC including both FR1 and FR2

#### 7.3B.3.5.2 $\Delta R_{IB,c}$ for EN-DC three bands

Unless otherwise stated, for inter-band EN-DC configurations defined in table 5.5B.6.2-1,  $\Delta R_{IB,c}$  for constituent FR2 NR bands is set to zero, and  $\Delta R_{IB,c}$  for constituent E-UTRA and FR1 NR bands is the same as those for the corresponding inter band EN-DC configuration without the FR2 bands specified in 7.3B.3.3.

**Table 7.3B.3.5.2-1: Void**

#### 7.3B.3.5.3 $\Delta R_{IB,c}$ for EN-DC four bands

Unless otherwise stated, for inter-band EN-DC configurations defined in table 5.5B.6.3-1,  $\Delta R_{IB,c}$  for constituent FR2 NR bands is set to zero, and  $\Delta R_{IB,c}$  for constituent E-UTRA and FR1 NR bands is the same as those for the corresponding inter band EN-DC configuration without the FR2 bands specified in 7.3B.3.3.

#### 7.3B.3.5.4 $\Delta R_{IB,c}$ for EN-DC five bands

Unless otherwise stated, for a certain inter-band EN-DC configurations defined in table 5.5B.6.4-1,  $\Delta R_{IB,c}$  for constituent FR2 NR bands is set to zero, and  $\Delta R_{IB,c}$  for constituent E-UTRA and FR1 NR bands is the same as those for the corresponding inter band EN-DC configuration without the FR2 bands specified in 7.3B.3.3.

### 7.3B.3.5.5 $\Delta R_{IB,c}$ for EN-DC six bands

Unless otherwise stated, for inter-band EN-DC configurations defined in table 5.5B.6.5-1,  $\Delta R_{IB,c}$  for constituent FR2 NR bands is set to zero, and  $\Delta R_{IB,c}$  for constituent E-UTRA and FR1 NR bands is the same as those for the corresponding inter band EN-DC configuration without the FR2 bands specified in 7.3B.3.3.

## 7.4 Void

### 7.4A Maximum input level for CA

For inter-band NR CA between FR1 and FR2, the maximum input level specified in TS 38.101-1 [2] and TS 38.101-2 [3] apply for FR1 and FR2 respectively.

### 7.4B Maximum input level for DC in FR1

#### 7.4B.1 Intra-band contiguous EN-DC in FR1

Intra-band contiguous EN-DC maximum input level requirement and parameters are defined in Table 7.4B.1-1.

**Table 7.4B.1-1: Maximum Input**

| Power in Largest CC, E-UTRA or NR, dBm  | $X^1$   |
|---|---|
| Power in each other CC, dBm   | $X^1 - 10 \cdot \log_{10}(N_x \text{SCS}_x / N_y \text{SCS}_y)$ |
| NOTE 1: Power in Largest E-UTRA or NR bandwidth CC, listed in Table 7.4-1 [2]   |   |
| NOTE 2: $N_x$ , $\text{SCS}_x$ is the number of RB's and Sub carrier spacing in the largest carrier bandwidth and could be E-UTRA or NR carrier |   |
| NOTE 3: $N_y$ , $\text{SCS}_y$ is the number of RB's in any other carrier.  |   |
| NOTE 4: Void.   |   |
| NOTE 5: Void.   |   |

#### 7.4B.2 Intra-band non-contiguous EN-DC in FR1

For the E-UTRA sub-block containing one or multiple CC's, the requirement is defined in clause 7.4.1 for single carrier operation and in clause 7.4.1A for CA in TS 36.101 [4].

For the NR sub-block, the requirement is defined in clause 7.4 in TS 38.101-1 [2].

#### 7.4B.3 Inter-band EN-DC within FR1

Maximum input level requirement for E-UTRA single carrier and CA operation specified in clauses 7.4.1 and 7.4.1A of TS 36.101 [4] and for NR single carrier and CA operation specified in clauses 7.4 and 7.4A of TS 38.101-1 [2] apply.

#### 7.4B.3a Inter-band NE-DC within FR1

Maximum input level requirement for E-UTRA single carrier and CA operation specified in clauses 7.4.1 and 7.4.1A of TS 36.101 [4] and for NR single carrier and CA operation specified in clauses 7.4 and 7.4A of TS 38.101-1 [2] apply.

#### 7.4B.4 Inter-band EN-DC including FR2

Maximum input level requirement for E-UTRA single carrier and CA operation specified in clauses 7.4.1 and 7.4.1A of TS 36.101 [4] and for NR single carrier and CA operation specified in clauses 7.4, 7. and 7.4B of TS 38.101-2 [3] apply.

## 7.4B.5 Inter-band EN-DC including both FR1 and FR2

Maximum input level requirement for E-UTRA single carrier and CA operation specified in clauses 7.4.1 and 7.4.1A of TS 36.101 [4] and for NR single carrier and CA operation specified in clauses 7.4, 7.4A and 7.4B of TS 38.101-1 [2] and TS 38.101-2 [3] apply.

## 7.5 Void

### 7.5A Adjacent channel selectivity for CA

For inter-band NR CA between FR1 and FR2, the adjacent channel selectivity specified in TS 38.101-1 [2] and TS 38.101-2 [3] apply for FR1 and FR2 respectively.

### 7.5B Adjacent channel selectivity for DC in FR1

#### 7.5B.1 Intra-band contiguous EN-DC in FR1

Intra-band contiguous EN-DC ACS requirement and parameters are defined for test case 1 in Table 7.5B.1-1 and for test case 2 in Table 7.5B.1-2.

**Table 7.5B.1-1: ACS test case 1**

| EN-DC Aggregated Bandwidth, MHz   | $\leq 100$    | $>100, \leq 120$           | $>120, \leq 140$         | $>140, \leq 160$           |
|---|---------------|----------------------------|--------------------------|----------------------------|
| ACS, dB   | $X^1$         | 19.2                       | 18.5                     | 17.9                       |
| $P_{\text{interferer}}$ , dBm   | $P_I^2$       | Aggregated power + 17.7 dB | Aggregated power + 17 dB | Aggregated power + 16.4 dB |
| $P_w$ in Transmission BW configuration, per CC, dBm   | REFSENS +14dB |                            |                          |                            |
| NOTE 1: X is ACS level at the specified EN-DC aggregated bandwidth from Table 7.5.1A-1 in TS 36.101 [4]   |               |                            |                          |                            |
| NOTE 2: $P_I$ is from Table 7.5.1A-2 in TS 36.101 [4]   |               |                            |                          |                            |
| NOTE 3: Jammer BW and offset is from Table 7.5.1A-2 [4] and is applied from the lowest edge of the lowest carrier and the highest edge of the highest carrier |               |                            |                          |                            |
| NOTE 4: Void.   |               |                            |                          |                            |
| NOTE 5: Void.   |               |                            |                          |                            |

**Table 7.5B.1-2: ACS test case 2**

| EN-DC Aggregated Bandwidth, ENBW, MHz   | $\leq 100$ | $>100, \leq 120$                            | $>120, \leq 140$                          | $>140, \leq 160$                            |
|---|------------|---|---|---|
| $P_w$ in Transmission Bandwidth Configuration, per CC, dBm  | $P_W^1$    | $-42.7 + 10\log_{10}(N_{RB,c}/N_{RB\_agg})$ | $-42 + 10\log_{10}(N_{RB,c}/N_{RB\_agg})$ | $-41.4 + 10\log_{10}(N_{RB,c}/N_{RB\_agg})$ |
| $P_{\text{interferer}}$ , dBm   | -25        |   |   |   |
| NOTE 1: $P_w$ is wanted signal power level at the specified EN-DC aggregated Bandwidth from Table 7.5.1A-3 in TS 36.101 [4]                                   |            |   |   |   |
| NOTE 2: Jammer BW and offset is from Table 7.5.1A-3 [4] and is applied from the lowest edge of the lowest carrier and the highest edge of the highest carrier |            |   |   |   |
| NOTE 3: Void.   |            |   |   |   |
| NOTE 4: Void.   |            |   |   |   |

#### 7.5B.2 Intra-band non-contiguous EN-DC in FR1

For the E-UTRA sub-block containing one or multiple CC's, the requirement is defined in clause 7.5.1 for single carrier operation and in clause 7.5.1A for CA in TS 36.101 [4].

For the NR sub-block, the requirement is defined in clause 7.5 in TS 38.101-1 [2].

The blocker configuration is defined in the general clause 7.1.

### 7.5B.3 Inter-band EN-DC within FR1

Adjacent channel selectivity requirement for E-UTRA single carrier and CA operation specified in clauses 7.5.1 and 7.5.1A of TS 36.101 [4] and for NR single carrier and CA operation specified in clauses 7.5 and 7.5A of TS 38.101-1 [2] apply.

#### 7.5B.3a Inter-band NE-DC within FR1

Adjacent channel selectivity requirement for E-UTRA single carrier and CA operation specified in clauses 7.5.1 and 7.5.1A of TS 36.101 [4] and for NR single carrier and CA operation specified in clauses 7.5 and 7.5A of TS 38.101-1 [2] apply.

### 7.5B.4 Inter-band EN-DC including FR2

Adjacent channel selectivity requirement for E-UTRA single carrier and CA operation specified in clauses 7.5.1 and 7.5.1A of TS 36.101 [4] and for NR single carrier and CA operation specified in clauses 7.5, 7.5A and 7.5B of TS 38.101-2 [3] apply.

### 7.5B.5 Inter-band EN-DC including both FR1 and FR2

Adjacent channel selectivity requirement for E-UTRA single carrier and CA operation specified in clauses 7.5.1 and 7.5.1A of TS 36.101 [4] and for NR single carrier and CA operation specified in clauses 7.5, 7.5A and 7.5B of TS 38.101-1 [2] and TS 38.101-2 [3] apply.

## 7.6 Void

### 7.6A Blocking characteristics for CA

For inter-band NR CA between FR1 and FR2, the in-band blocking characteristics specified in TS 38.101-1 [2] and TS 38.101-2 [3] apply for FR1 and FR2 respectively. The narrow band blocking and out-of-band blocking specified in TS 38.101-1 [2] apply for FR1.

### 7.6B Blocking characteristics for DC in FR1

#### 7.6B.1 General

#### 7.6B.2 In-band blocking for DC in FR1

##### 7.6B.2.1 Intra-band contiguous EN-DC in FR1

Intra-band contiguous EN-DC in-band blocking requirement and parameters are defined in Table 7.6B.2.1-1.

**Table 7.6B.2.1-1: In-band blocking**

| EN-DC Aggregated Bandwidth, MHz   | ≤100                        | >100, ≤120                                   | >120, ≤140 | >140, ≤160 |
|---|-----------------------------|--|------------|------------|
| P <sub>w</sub> in Transmission Bandwidth Configuration, perCC, dBm  | P <sub>w</sub> <sup>1</sup> | REFSENS + Aggregated BW specific value below |            |            |
|   |                             | 16.8   | 17.5       | 18         |
| NOTE 1: P <sub>w</sub> is wanted signal power level at the specified EN-DC aggregated Bandwidth from Table 7.6.1.1A-1 in TS 36.101 [4]                          |                             |  |            |            |
| NOTE 2: Interferer values are specified from Table 7.6.1.1A-2 in TS 36.101 [4]  |                             |  |            |            |
| NOTE 3: Jammer BW and offset is from Table 7.6.1.1A-1 [4] and is applied from the lowest edge of the lowest carrier and the highest edge of the highest carrier |                             |  |            |            |
| NOTE 4: Void.   |                             |  |            |            |
| NOTE 5: Void.   |                             |  |            |            |

##### 7.6B.2.2 Intra-band non-contiguous EN-DC in FR1

For the E-TRA sub-block containing one or multiple CC's, the requirement is defined in clause 7.6.1.1 for single carrier operation and in clause 7.6.1.1A for CA in TS 36.101 [4].

For the NR sub-block, the requirement is defined in clause 7.6.2 in TS 38.101-1 [2].

The blocker configuration is defined in the general clause 7.1.

##### 7.6B.2.3 Inter-band EN-DC within FR1

Inband blocking requirement for E-UTRA single carrier and CA operation specified in clauses 7.6.1.1 and 7.6.1.1A of TS 36.101 [4] and for NR single carrier and CA operation specified in clauses 7.6.2 and 7.6A.2 of TS 38.101-1 [2] apply.

##### 7.6B.2.3a Inter-band NE-DC within FR1

Inband blocking requirement for E-UTRA single carrier and CA operation specified in clauses 7.6.1.1 and 7.6.1.1A of TS 36.101 [4] and for NR single carrier and CA operation specified in clauses 7.6.2 and 7.6A.2 of TS 38.101-1 [2] apply.

### 7.6B.2.4 Inter-band EN-DC including FR2

Inband blocking requirement for E-UTRA single carrier and CA operation specified in clauses 7.6.1.1 and 7.6.1.1A of TS 36.101 [4] and for NR single carrier and CA operation specified in clauses 7.6.2, 7.6A.2 and 7.6B.2 of TS 38.101-1 [3] apply.

### 7.6B.2.5 Inter-band EN-DC including both FR1 and FR2

Inband blocking requirement for E-UTRA single carrier and CA operation specified in clauses 7.6.1.1 and 7.6.1.1A of TS 36.101 [4] and for NR single carrier and CA operation specified in clauses 7.6.2, 7.6A.2 and 7.6B.2 of TS 38.101-1 [2] and TS 38.101-2 [3] apply.

## 7.6B.3 Out-of-band blocking for DC in FR1

### 7.6B.3.1 Intra-band contiguous EN-DC in FR1

Intra-band contiguous EN-DC out-of-band requirement and parameters are defined in Table 7.6B.3.1-1.

**Table 7.6B.3.1-1: Out-of-band blocking**

| EN-DC Aggregated Bandwidth, MHz  | $\leq 100$                                   | $>100, \leq 120$ | $>120, \leq 140$ | $>140, \leq 160$ |
|--|--|------------------|------------------|------------------|
| Pw in Transmission Bandwidth Configuration, perCC, dBm                                     | REFSENS + Aggregated BW specific value below |                  |                  |                  |
|  | 9  |                  |                  |                  |
| NOTE 1: Interferer values and offsets are specified from Table 7.6.2.1A-2 in TS 36.101 [4] |  |                  |                  |                  |
| NOTE 2: Void.  |  |                  |                  |                  |
| NOTE 3: Void.  |  |                  |                  |                  |

For Table 7.6.2.1A-2 from TS 36.101 [4] in frequency range 1, 2 and 3, up to  $\max(24, 6 \cdot \lceil N_{RB} / 6 \rceil)$  exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a 1MHz step size. For these exceptions the requirements of subclause 7.7B.1 Spurious response are applicable.

### 7.6B.3.2 Intra-band non-contiguous EN-DC in FR1

For the E-UTRA sub-block containing one or multiple CC's, the requirement is defined in clause 7.6.2.1 for single carrier operation and in clause 7.6.2.1A for CA in TS 36.101 [4].

For the NR sub-block, the requirement is defined in clause 7.6.3 is [2].

### 7.6B.3.3 Inter-band EN-DC within FR1

Out-of band blocking requirements for E-UTRA single carrier and CA operation specified in clauses 7.6.2.1 and 7.6.2.1A of TS 36.101 [4] and for NR single carrier and CA operation specified in clauses 7.6.3 and 7.6A.3 of TS 38.101-1 [2] apply for lowest level EN-DC fallbacks (two bands) in clause 5.5B.4.1 with following conditions

one E-UTRA uplink carrier with the output power set to 4 dB below  $P_{\text{CMAX\_L,c}}$  and the NR band whose downlink is being tested has its uplink carrier output power set to 29 dB below  $P_{\text{CMAX\_L,f,c}}$ .

one NR uplink carrier with the output power set to 4 dB below  $P_{\text{CMAX\_L,f,c}}$  on the NR band with both E-UTRA and NR downlinks being tested with E-UTRA output power set to 29 dB below  $P_{\text{CMAX\_L,c}}$ .

If CW interferer falls in a gap between  $F_{\text{DL\_high}}$  of the E-UTRA or NR band and  $F_{\text{DL\_low}}$  of the NR or EUTRA band, where the corresponding OOB ranges 1 and 2 overlap, then the lower level interferer limit of the overlapping OOB ranges applies.

If  $F_{\text{DL\_high}}$  of the lower E-UTRA or NR band is greater than or equal to the  $F_{\text{DL\_low}}$  of the upper NR or E-UTRA band as in overlapping RX frequency ranges, then the OOB range shall start from the  $F_{\text{DL\_low}}$  of the lower E-UTRA or NR band, and from the  $F_{\text{DL\_high}}$  of the upper NR or E-UTRA band.



For EN-DC combination listed in Table 7.6B.3.3-1 under the first test condition above, exceptions to the requirement specified in Table 7.6B.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.

**Table 7.6B.3.3-1: EN-DC combination with exceptions allowed**

| EN-DC combination |
|-------------------|
| DC_5_n78          |
| DC_8_n77          |
| DC_8_n78          |
| DC_8_n79          |
| DC_11_n77         |
| DC_18_n77         |
| DC_18_n78         |
| DC_18_n79         |
| DC_19_n77         |
| DC_19_n78         |
| DC_19_n79         |
| DC_20_n77         |
| DC_20_n78         |
| DC_21_n77         |
| DC_26_n77         |
| DC_26_n78         |
| DC_26_n79         |
| DC_28_n77         |
| DC_28_n78         |
| DC_28_n79         |

| 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 each of the two test cases in clauses 7.6.2.1 and 7.6.2.1A of TS 36.101 [4] and for NR single carrier and CA operation specified in clauses 7.6.3 and 7.6A.3 of TS 38.101-1 [2] for all interferer frequency ranges a maximum of

$$\lfloor \max\{24,6 \cdot \lceil n \cdot N_{\text{RB}} / 6 \rceil \} / \min\{n \cdot N_{\text{RB}} / 10, 5\} \rfloor$$

exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a step size of  $\min(\lfloor CBW/2 \rfloor, 5)$  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 7.7 apply.

**7.6B.3.3a Inter-band NE-DC within FR1**

Out-of band blocking requirements for E-UTRA single carrier and CA operation specified in clauses 7.6.2.1 and 7.6.2.1A of TS 36.101 [4] and for NR single carrier and CA operation specified in clauses 7.6.3 and 7.6A.3 of TS 38.101-1 [2] apply for lowest level NE-DC fallbacks (two bands) in clause 5.5B.4a.1 with following conditions

one E-UTRA uplink carrier with the output power set to 4 dB below  $P_{\text{CMAX\_L,c}}$  and the NR band whose downlink is being tested has its uplink carrier output power set to 29 dB below  $P_{\text{CMAX\_L,f,c}}$ .

one NR uplink carrier with the output power set to 4 dB below  $P_{\text{CMAX\_L,f,c}}$  on the NR band with both E-UTRA and NR downlinks being tested with E-UTRA output power set to 29 dB below  $P_{\text{CMAX\_L,c}}$ .

### 7.6B.3.4 Inter-band EN-DC including FR2

Out-of band blocking requirements specified for E-UTRA single carrier and CA operation specified in clauses 7.6.2.1 and 7.6.2.1A of TS 36.101 [4] apply for lowest level EN-DC fallbacks (two bands) in clause 5.5B.5.1 with only E-UTRA UL with output power as in TS 36.101 [4] (4 dB below  $P_{\text{CMAX\_L}}$ ).

### 7.6B.3.5 Inter-band EN-DC including both FR1 and FR2

Out-of band blocking requirements specified for E-UTRA single carrier and CA operation specified in clauses 7.6.2.1 and 7.6.2.1A of TS 36.101 [4] and for NR single carrier and CA operation specified in clauses 7.6.3 and 7.6A.3 of TS 38.101-1 [2] apply for lowest level EN-DC fallbacks (three bands) in clause 5.5B.6.2 with only E-UTRA UL with output power as in TS 36.101 [4] (4 dB below  $P_{\text{CMAX\_L}}$ ).

## 7.6B.4 Narrow band blocking for DC in FR1

### 7.6B.4.1 Intra-band contiguous EN-DC in FR1

Intra-band contiguous EN-DC narrow band blocking requirement and parameters are defined in Table 7.6B.4.1-1.

**Table 7.6B.4.1-1: Narrow band blocking parameters**

| EN-DC Aggregated Bandwidth, MHz  | $\leq 100$                                   | $>100, \leq 120$ | $>120, \leq 140$ | $>140, \leq 160$ |
|--|--|------------------|------------------|------------------|
| Pw in Transmission Bandwidth Configuration, perCC, dBm   | REFSENS + Aggregated BW specific value below |                  |                  |                  |
| $P_{\text{UW}}$ , dBm (CW)   | 16   |                  |                  |                  |
|  | -55  |                  |                  |                  |
| NOTE 1: Jammer offset is from Table 7.6.3.1A-1 [4] and is applied from the lowest edge of the lowest carrier and the highest edge of the highest carrier |  |                  |                  |                  |
| NOTE 2: Void.  |  |                  |                  |                  |
| NOTE 3: Void.  |  |                  |                  |                  |
| NOTE 4: If NR carrier BW > 40 MHz, no narrow band blocking requirements apply when blocker is applied at the edge of the NR carrier.                     |  |                  |                  |                  |

### 7.6B.4.2 Intra-band non-contiguous EN-DC in FR1

For the E-TRA sub-block containing one or multiple CC's, the requirement is defined in clause 7.6.3.1 for single carrier operation and in clause 7.6.3.1A for CA in TS 36.101 [4].

For the NR sub-block, the requirement is defined in clause 7.6.4 in TS 38.101-1 [2].

The blocker configuration is defined in the general clause 7.1.

### 7.6B.4.3 Inter-band EN-DC within FR1

Narrow band blocking requirement for E-UTRA single carrier and CA operation specified in clauses 7.6.3.1 and 7.6.3.1A of TS 36.101 [4] and for NR single carrier and CA operation specified in clauses 7.6.4 and 7.6A.4 of TS 38.101-1 [2] apply.

### 7.6B.4.3a Inter-band NE-DC within FR1

Narrow band blocking requirement for E-UTRA single carrier and CA operation specified in clauses 7.6.3.1 and 7.6.3.1A of TS 36.101 [4] and for NR single carrier and CA operation specified in clauses 7.6.4 and 7.6A.4 of TS 38.101-1 [2] apply.

#### 7.6B.4.4 Inter-band EN-DC including FR2

Narrow band blocking requirement for E-UTRA single carrier and CA operation specified in clauses 7.6.3.1 and 7.6.3.1A of TS 36.101 [4] apply.

#### 7.6B.4.5 Inter-band EN-DC including both FR1 and FR2

Narrow band blocking requirement for E-UTRA single carrier and CA operation specified in clauses 7.6.3.1 and 7.6.3.1A of TS 36.101 [4] and for NR single carrier and CA operation specified in clauses 7.6.4 and 7.6A.4 of TS 38.101-1 [2] apply.

### 7.7 Void

#### 7.7A Spurious response for CA

For inter-band NR CA between FR1 and FR2, the spurious response specified in TS 38.101-1 [2] apply for FR1.

#### 7.7B Spurious response for DC in FR1

##### 7.7B.1 Intra-band contiguous EN-DC in FR1

Intra-band contiguous EN-DC spurious response requirement and parameters are defined in Table 7.7B.1-1.

**Table 7.7B.1-1: Spurious Response Parameters**

| EN-DC Aggregated Bandwidth, MHz                        | ≤100   | >100, ≤120 | >120, ≤140 | >140, ≤160 |
|--|--|------------|------------|------------|
| Pw in Transmission Bandwidth Configuration, perCC, dBm | REFSENS + Aggregated BW specific value below |            |            |            |
| P <sub>interferer</sub> , dBm (CW)                     | -44  |            |            |            |
| NOTE 1: Void.  |  |            |            |            |
| NOTE 2: Void.  |  |            |            |            |

##### 7.7B.2 Intra-band non-contiguous EN-DC in FR1

For the E-UTRA sub-block containing one or multiple CC's, the requirement is defined in clause 7.7.1 for single carrier operation and in clause 7.7.1A for CA in TS 36.101 [4].

For the NR sub-block, the requirement is defined in clause 7.7 is [2].

##### 7.7B.3 Inter-band EN-DC within FR1

Spurious response requirement for E-UTRA single carrier and CA operation specified in clauses 7.7.1 and 7.7.1A of TS 36.101 [4] and for NR single carrier and CA operation specified in clauses 7.7 and 7.7A of TS 38.101-1 [2] apply for lowest level EN-DC fallbacks (two bands) in clause 5.5B.4.1 with following conditions

- one E-UTRA uplink carrier with the output power set to 4 dB below  $P_{\text{CMAX\_L,c}}$  and the NR band whose downlink is being tested has its uplink carrier output power set to 29 dB below  $P_{\text{CMAX\_L,f,c}}$ .
- one NR uplink carrier with the output power set to 4 dB below  $P_{\text{CMAX\_L,f,c}}$  on the NR band with both E-UTRA and NR downlinks being tested with E-UTRA output power set to 29 dB below  $P_{\text{CMAX\_L,c}}$ .

##### 7.7B.3a Inter-band NE-DC within FR1

Spurious response requirement for E-UTRA single carrier and CA operation specified in clauses 7.7.1 and 7.7.1A of TS 36.101 [4] and for NR single carrier and CA operation specified in clauses 7.7 and 7.7A of TS 38.101-1 [2] apply for lowest level NE-DC fallbacks (two bands) in clause 5.5B.4a.1 with following conditions

one E-UTRA uplink carrier with the output power set to 4 dB below  $P_{\text{CMAX\_L,c}}$  and the NR band whose downlink is being tested has its uplink carrier output power set to 29 dB below  $P_{\text{CMAX\_L,f,c}}$ .

one NR uplink carrier with the output power set to 4 dB below  $P_{\text{CMAX\_L,f,c}}$  on the NR band with both E-UTRA and NR downlinks being tested with E-UTRA output power set to 29 dB below  $P_{\text{CMAX\_L,c}}$ .

## 7.7B.4 Inter-band EN-DC including FR2

Spurious response requirement for E-UTRA single carrier and CA operation specified in clauses 7.7.1 and 7.7.1A of TS 36.101 [4] apply for lowest level EN-DC fallbacks (two bands) in clause 5.5B.5.1 with only E-UTRA UL with output power as in TS 36.101 [4] (4 dB below  $P_{\text{CMAX\_L}}$ ).

## 7.7B.5 Inter-band EN-DC including both FR1 and FR2

Spurious response requirement for E-UTRA single carrier and CA operation specified in clauses 7.7.1 and 7.7.1A of TS 36.101 [4] and for NR single carrier and CA operation specified in clauses 7.7 and 7.7A of TS 38.101-1 [2] apply for lowest level EN-DC fallbacks (three bands) in clause 5.5B.6.2 with only E-UTRA UL with output power as in TS 36.101 [4] (4 dB below  $P_{\text{CMAX\_L}}$ ).

## 7.8 Void

### 7.8A Intermodulation characteristics for CA

For inter-band NR CA between FR1 and FR2, the intermodulation characteristics specified in TS 38.101-1 [2] apply for FR1.

### 7.8B Intermodulation characteristics for DC in FR1

#### 7.8B.1 General

#### 7.8B.2 Wide band Intermodulation

##### 7.8B.2.1 Intra-band contiguous EN-DC in FR1

Intra-band contiguous EN-DC wide band intermodulation requirement and parameters are defined in Table 7.8B.2.1-1.

**Table 7.8B.2.1-1: Wide band intermodulation**

| EN-DC Aggregated Bandwidth, MHz  | <=100                       | >100, <=120                                  | >120, <=140 | >140, <=160 |
|--|-----------------------------|--|-------------|-------------|
| P <sub>w</sub> in Transmission Bandwidth Configuration, perCC, dBm   | P <sub>w</sub> <sup>1</sup> | REFSENS + Aggregated BW specific value below |             |             |
|  |                             | 16.8   | 17.5        | 18.0        |
| P <sub>interferer 1</sub> , dBm (CW) <sup>2</sup>  | -46                         |  |             |             |
| P <sub>interferer 2</sub> , dBm (Modulated) <sup>2</sup>   | -46                         |  |             |             |
| NOTE 1: P <sub>w</sub> is wanted signal power level from Table 7.8.1A-1 in TS 36.101 [4]   |                             |  |             |             |
| NOTE 2: Jammer BW and offsets is from Table 7.8.1A-1 [4] and is applied from the lowest edge of the lowest carrier and the highest edge of the highest carrier |                             |  |             |             |
| NOTE 3: Void.  |                             |  |             |             |
| NOTE 4: Void.  |                             |  |             |             |

##### 7.8B.2.2 Intra-band non-contiguous EN-DC in FR1

For the E-UTRA sub-block containing one or multiple CC's, the requirement is defined in clause 7.8.1 for single carrier operation and in clause 7.8.1A for CA in TS 36.101 [4].

For the NR sub-block, the requirement is defined in clause 7.8.2 in TS 38.101-1 [2].

The blocker configuration is defined in the general clause 7.1 and the requirement only apply for out of gap interferers.

### 7.8B.2.3 Inter-band EN-DC within FR1

Wide band Intermodulation requirement for E-UTRA single carrier and CA operation specified in clauses 7.8.1 and 7.8.1A of TS 36.101 [4] and for NR single carrier and CA operation specified in clauses 7.8.2 and 7.8A.2 of TS 38.101-1 [2] apply.

### 7.8B.2.3a Inter-band NE-DC within FR1

Wide band Intermodulation requirement for E-UTRA single carrier and CA operation specified in clauses 7.8.1 and 7.8.1A of TS 36.101 [4] and for NR single carrier and CA operation specified in clauses 7.8.2 and 7.8A.2 of TS 38.101-1 [2] apply.

### 7.8B.2.4 Inter-band EN-DC including FR2

Wide band Intermodulation requirement for E-UTRA single carrier and CA operation specified in clauses 7.8.1 and 7.8.1A of TS 36.101 [4] apply.

### 7.8B.2.5 Inter-band EN-DC including both FR1 and FR2

Wide band Intermodulation requirement for E-UTRA single carrier and CA operation specified in clauses 7.8.1 and 7.8.1A of TS 36.101 [4] and for NR single carrier and CA operation specified in clauses 7.8.2 and 7.8A.2 of TS 38.101-1 [2] apply.

## 7.9 Void

### 7.9A Spurious emissions for CA

For inter-band NR CA between FR1 and FR2, the spurious emission specified in TS 38.101-1 [2] and TS 38.101-2 [3] apply for FR1 and FR2 respectively.

### 7.9B Spurious emissions for DC in FR1

#### 7.9B.1 Intra-band contiguous EN-DC in FR1

The requirement is defined in clause 7.9A.1 in TS 38.101-1 [2].

#### 7.9B.2 Intra-band non-contiguous EN-DC in FR1

Spurious emissions requirement for E-UTRA single carrier and CA operation specified in clauses 7.9.1 and 7.9.1A of TS 36.101 [4] and for NR single carrier and CA operation specified in clauses 7.9 and 7.9A of TS 38.101-1 [2] apply.

#### 7.9B.3 Inter-band EN-DC within FR1

E-UTRA requirements from TS 36.101 [4] and NR requirements from TS 38.101-1 [2] apply.

#### 7.9B.3a Inter-band NE-DC within FR1

E-UTRA requirements from TS 36.101 [4] and NR requirements from TS 38.101-1 [2] apply.

#### 7.9B.4 Inter-band EN-DC including FR2

Spurious emissions requirement for E-UTRA single carrier and CA operation specified in clauses 7.9.1 and 7.9.1A of TS 36.101 [4] and for NR single carrier and CA operation specified in clause 7.9 of TS 38.101-2 [3] apply.

#### 7.9B.5 Inter-band EN-DC including both FR1 and FR2

Spurious emissions requirement for E-UTRA single carrier and CA operation specified in clauses 7.9.1 and 7.9.1A of TS 36.101 [4] and for NR single carrier and CA operation specified in clauses 7.9 and 7.9A of TS 38.101-1 [2] and TS 38.101-2 [3] apply.

## 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 for E-UTRA TDD Config 2

#### 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.

#### A.2.2 Reference measurement channels for E-UTRA

##### A.2.2.1 Full RB allocation

##### A.2.2.1.1 QPSK

**Table A.2.2.1.1-1: Reference Channels for QPSK with full RB allocation**

| Parameter                                    | Unit | Value |      |      |       |       |       |
|--|------|-------|------|------|-------|-------|-------|
| Channel bandwidth                            | MHz  | 1.4   | 3    | 5    | 10    | 15    | 20    |
| Allocated resource blocks                    |      | 6     | 15   | 25   | 50    | 75    | 100   |
| Uplink-Downlink Configuration (NOTE 2)       |      | 2     | 2    | 2    | 2     | 2     | 2     |
| Special subframe configuration (NOTE 3)      |      | 7     | 7    | 7    | 7     | 7     | 7     |
| DFT-OFDM Symbols per Sub-Frame               |      | 12    | 12   | 12   | 12    | 12    | 12    |
| Modulation                                   |      | QPSK  | QPSK | QPSK | QPSK  | QPSK  | QPSK  |
| Target Coding rate                           |      | 1/3   | 1/3  | 1/3  | 1/3   | 1/5   | 1/6   |
| Payload size                                 |      |       |      |      |       |       |       |
| For Sub-Frame 2,7                            | Bits | 600   | 1544 | 2216 | 5160  | 4392  | 4584  |
| Transport block CRC                          | Bits | 24    | 24   | 24   | 24    | 24    | 24    |
| Number of code blocks per Sub-Frame (NOTE 1) |      |       |      |      |       |       |       |
| For Sub-Frame 2,7                            |      | 1     | 1    | 1    | 1     | 1     | 1     |
| Total number of bits per Sub-Frame           |      |       |      |      |       |       |       |
| For Sub-Frame 2,7                            | Bits | 1728  | 4320 | 7200 | 14400 | 21600 | 28800 |
| Total symbols per Sub-Frame                  |      |       |      |      |       |       |       |
| For Sub-Frame 2,7                            |      | 864   | 2160 | 3600 | 7200  | 10800 | 14400 |
| UE Category                                  |      | ≥ 1   | ≥ 1  | ≥ 1  | ≥ 1   | ≥ 1   | ≥ 1   |

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: As per Table 4.2-2 in TS 36.211 [7]  
 NOTE 3: As per Table 4.2-1 in TS 36.211 [7]

A.2.2.1.2 16-QAM

**Table A.2.2.1.2-1: Reference Channels for 16-QAM with full RB allocation**

| Parameter  | Unit | Value |       |       |       |       |       |
|--|------|-------|-------|-------|-------|-------|-------|
|  |      | 1.4   | 3     | 5     | 10    | 15    | 20    |
| Channel bandwidth  | MHz  | 1.4   | 3     | 5     | 10    | 15    | 20    |
| Allocated resource blocks  |      | 6     | 15    | 25    | 50    | 75    | 100   |
| Uplink-Downlink Configuration (NOTE 2)   |      | 2     | 2     | 2     | 2     | 2     | 2     |
| Special subframe configuration (NOTE 3)  |      | 7     | 7     | 7     | 7     | 7     | 7     |
| DFT-OFDM Symbols per Sub-Frame   |      | 12    | 12    | 12    | 12    | 12    | 12    |
| Modulation   |      | 16QAM | 16QAM | 16QAM | 16QAM | 16QAM | 16QAM |
| Target Coding rate   |      | 3/4   | 1/2   | 1/3   | 3/4   | 1/2   | 1/3   |
| Payload size   |      |       |       |       |       |       |       |
| For Sub-Frame 2,7  | Bits | 2600  | 4264  | 4968  | 21384 | 21384 | 19848 |
| Transport block CRC  | Bits | 24    | 24    | 24    | 24    | 24    | 24    |
| Number of code blocks per Sub-Frame (NOTE 1)   |      |       |       |       |       |       |       |
| For Sub-Frame 2,7  |      | 1     | 1     | 1     | 4     | 4     | 4     |
| Total number of bits per Sub-Frame   |      |       |       |       |       |       |       |
| For Sub-Frame 2,7  | Bits | 3456  | 8640  | 14400 | 28800 | 43200 | 57600 |
| Total symbols per Sub-Frame  |      |       |       |       |       |       |       |
| For Sub-Frame 2,7  |      | 864   | 2160  | 3600  | 7200  | 10800 | 14400 |
| UE Category  |      | ≥ 1   | ≥ 1   | ≥ 1   | ≥ 2   | ≥ 2   | ≥ 2   |
| 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: As per Table 4.2-2 in TS 36.211 [7]  |      |       |       |       |       |       |       |
| NOTE 3: As per Table 4.2-1 in TS 36.211 [7]  |      |       |       |       |       |       |       |

A.2.2.1.3 64-QAM

**Table A.2.2.1.3-1: Reference Channels for 64-QAM with full RB allocation**

| Parameter                                    | Unit | Value        |              |              |              |              |              |
|--|------|--------------|--------------|--------------|--------------|--------------|--------------|
|  |      | 1.4          | 3            | 5            | 10           | 15           | 20           |
| Channel bandwidth                            | MHz  | 1.4          | 3            | 5            | 10           | 15           | 20           |
| Allocated resource blocks                    |      | 6            | 15           | 25           | 50           | 75           | 100          |
| Uplink-Downlink Configuration (NOTE 2)       |      | 2            | 2            | 2            | 2            | 2            | 2            |
| Special subframe configuration (NOTE 3)      |      | 7            | 7            | 7            | 7            | 7            | 7            |
| DFT-OFDM Symbols per Sub-Frame               |      | 12           | 12           | 12           | 12           | 12           | 12           |
| Modulation                                   |      | 64QAM        | 64QAM        | 64QAM        | 64QAM        | 64QAM        | 64QAM        |
| Target Coding rate                           |      | 3/4          | 3/4          | 3/4          | 3/4          | 3/4          | 3/4          |
| Payload size                                 |      |              |              |              |              |              |              |
| For Sub-Frame 2,7                            | Bits | 3752         | 9528         | 15840        | 31704        | 46888        | 63776        |
| Transport block CRC                          | Bits | 24           | 24           | 24           | 24           | 24           | 24           |
| Number of code blocks per Sub-Frame (NOTE 1) |      |              |              |              |              |              |              |
| For Sub-Frame 2,7                            |      | 1            | 2            | 3            | 6            | 8            | 11           |
| Total number of bits per Sub-Frame           |      |              |              |              |              |              |              |
| For Sub-Frame 2,7                            | Bits | 5184         | 12960        | 21600        | 43200        | 64800        | 86400        |
| Total symbols per Sub-Frame                  |      |              |              |              |              |              |              |
| For Sub-Frame 2,7                            |      | 864          | 2160         | 3600         | 7200         | 10800        | 14400        |
| UE Category (NOTE 4)                         |      | 5, 8         | 5, 8         | 5, 8         | 5, 8         | 5, 8         | 5, 8         |
| UE UL Category (NOTE 4)                      |      | 5, 8, 13, 14 | 5, 8, 13, 14 | 5, 8, 13, 14 | 5, 8, 13, 14 | 5, 8, 13, 14 | 5, 8, 13, 14 |



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: As per Table 4.2-2 in TS 36.211 [7]  
 NOTE 3: As per Table 4.2-1 in TS 36.211 [7]  
 NOTE 4: If UE does not report UE UL category, then the applicability of reference channel is determined by UE category. If UE reports UE UL category, then the applicability of reference channel is determined by UE UL category.

A.2.2.1.4 256 QAM

**Table A.2.2.1.4-1: Reference Channels for 256 QAM with full RB allocation**

| Parameter  | Unit | Value  |        |        |        |        |        |
|--|------|--------|--------|--------|--------|--------|--------|
|  |      | 1.4    | 3      | 5      | 10     | 15     | 20     |
| Channel bandwidth  | MHz  | 1.4    | 3      | 5      | 10     | 15     | 20     |
| Allocated resource blocks  |      | 6      | 15     | 25     | 50     | 75     | 100    |
| Uplink-Downlink Configuration (NOTE 2)   |      | 2      | 2      | 2      | 2      | 2      | 2      |
| Special subframe configuration (NOTE 3)  |      | 7      | 7      | 7      | 7      | 7      | 7      |
| DFT-OFDM Symbols per Sub-Frame   |      | 12     | 12     | 12     | 12     | 12     | 12     |
| Modulation   |      | 256QAM | 256QAM | 256QAM | 256QAM | 256QAM | 256QAM |
| Target Coding rate   |      | 3/4    | 3/4    | 3/4    | 3/4    | 3/4    | 3/4    |
| Payload size   |      |        |        |        |        |        |        |
| For Sub-Frame 2,7  | Bits | 5160   | 12960  | 21384  | 42368  | 63776  | 84760  |
| Transport block CRC  | Bits | 24     | 24     | 24     | 24     | 24     | 24     |
| Number of code blocks per Sub-Frame (NOTE 1)   |      |        |        |        |        |        |        |
| For Sub-Frame 2,7  |      | 1      | 3      | 4      | 8      | 11     | 15     |
| Total number of bits per Sub-Frame   |      |        |        |        |        |        |        |
| For Sub-Frame 2,7  | Bits | 6912   | 17280  | 28800  | 57600  | 86400  | 115200 |
| Total symbols per Sub-Frame  |      |        |        |        |        |        |        |
| For Sub-Frame 2,7  |      | 864    | 2160   | 3600   | 7200   | 10800  | 14400  |
| UE UL Category   |      | ≥ 15   | ≥ 15   | ≥ 15   | ≥ 15   | ≥ 15   | ≥ 15   |
| 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: As per Table 4.2-2 in TS 36.211 [7]  |      |        |        |        |        |        |        |
| NOTE 3: As per Table 4.2-1 in TS 36.211 [7]  |      |        |        |        |        |        |        |

A.2.2.2 Partial RB allocation

A.2.2.2.1 QPSK

**Table A.2.2.2.1-1: Reference Channels for QPSK with partial RB allocation**

| Parameter | Ch BW    | Allocated RBs | UL-DL Configuration (NOTE 2) | Special subframe configuration (NOTE 3) | DFT-OFDM Symbols per Sub-Frame | Mod'n | Target Coding rate | Payload size for Sub-Frame 2,7 | Transport block CRC | Number of code blocks per Sub-Frame (NOTE 1) | Total number of bits per Sub-Frame for Sub-Frame 2,7 | Total symbols per Sub-Frame for Sub-Frame 2,7 | UE Category |
|-----------|----------|---------------|------------------------------|---|--------------------------------|-------|--------------------|--------------------------------|---------------------|--|--|---|-------------|
| Unit      | MHz      |               |                              |   |                                |       |                    | Bits                           | Bits                |  | Bits   |   |             |
|           | 1.4 - 20 | 1             | 2                            | 7                                       | 12                             | QPSK  | 1/3                | 72                             | 24                  | 1  | 288  | 144   | ≥ 1         |
|           | 1.4 - 20 | 2             | 2                            | 7                                       | 12                             | QPSK  | 1/3                | 176                            | 24                  | 1  | 576  | 288   | ≥ 1         |
|           | 1.4 - 20 | 3             | 2                            | 7                                       | 12                             | QPSK  | 1/3                | 256                            | 24                  | 1  | 864  | 432   | ≥ 1         |
|           | 1.4 - 20 | 4             | 2                            | 7                                       | 12                             | QPSK  | 1/3                | 392                            | 24                  | 1  | 1152   | 576   | ≥ 1         |
|           | 1.4 - 20 | 5             | 2                            | 7                                       | 12                             | QPSK  | 1/3                | 424                            | 24                  | 1  | 1440   | 720   | ≥ 1         |
|           | 3-20     | 6             | 2                            | 7                                       | 12                             | QPSK  | 1/3                | 600                            | 24                  | 1  | 1728   | 864   | ≥ 1         |
|           | 3-20     | 8             | 2                            | 7                                       | 12                             | QPSK  | 1/3                | 808                            | 24                  | 1  | 2304   | 1152  | ≥ 1         |
|           | 3-20     | 9             | 2                            | 7                                       | 12                             | QPSK  | 1/3                | 776                            | 24                  | 1  | 2592   | 1296  | ≥ 1         |
|           | 3-20     | 10            | 2                            | 7                                       | 12                             | QPSK  | 1/3                | 872                            | 24                  | 1  | 2880   | 1440  | ≥ 1         |

|         |  |    |   |   |    |      |     |      |    |   |       |       |     |
|---------|--|----|---|---|----|------|-----|------|----|---|-------|-------|-----|
|         | 3-20   | 12 | 2 | 7 | 12 | QPSK | 1/3 | 1224 | 24 | 1 | 3456  | 1728  | ≥ 1 |
|         | 5-20   | 15 | 2 | 7 | 12 | QPSK | 1/3 | 1320 | 24 | 1 | 4320  | 2160  | ≥ 1 |
|         | 5-20   | 16 | 2 | 7 | 12 | QPSK | 1/3 | 1384 | 24 | 1 | 4608  | 2304  | ≥ 1 |
|         | 5-20   | 18 | 2 | 7 | 12 | QPSK | 1/3 | 1864 | 24 | 1 | 5184  | 2592  | ≥ 1 |
|         | 5-20   | 20 | 2 | 7 | 12 | QPSK | 1/3 | 1736 | 24 | 1 | 5760  | 2880  | ≥ 1 |
|         | 5-20   | 24 | 2 | 7 | 12 | QPSK | 1/3 | 2472 | 24 | 1 | 6912  | 3456  | ≥ 1 |
|         | 10-20  | 25 | 2 | 7 | 12 | QPSK | 1/3 | 2216 | 24 | 1 | 7200  | 3600  | ≥ 1 |
|         | 10-20  | 27 | 2 | 7 | 12 | QPSK | 1/3 | 2792 | 24 | 1 | 7776  | 3888  | ≥ 1 |
|         | 10-20  | 30 | 2 | 7 | 12 | QPSK | 1/3 | 2664 | 24 | 1 | 8640  | 4320  | ≥ 1 |
|         | 10-20  | 32 | 2 | 7 | 12 | QPSK | 1/3 | 2792 | 24 | 1 | 9216  | 4608  | ≥ 1 |
|         | 10-20  | 36 | 2 | 7 | 12 | QPSK | 1/3 | 3752 | 24 | 1 | 10368 | 5184  | ≥ 1 |
|         | 10-20  | 40 | 2 | 7 | 12 | QPSK | 1/3 | 4136 | 24 | 1 | 11520 | 5760  | ≥ 1 |
|         | 10-20  | 45 | 2 | 7 | 12 | QPSK | 1/3 | 4008 | 24 | 1 | 12960 | 6480  | ≥ 1 |
|         | 10-20  | 48 | 2 | 7 | 12 | QPSK | 1/3 | 4264 | 24 | 1 | 13824 | 6912  | ≥ 1 |
|         | 15 - 20  | 50 | 2 | 7 | 12 | QPSK | 1/3 | 5160 | 24 | 1 | 14400 | 7200  | ≥ 1 |
|         | 15 - 20  | 54 | 2 | 7 | 12 | QPSK | 1/3 | 4776 | 24 | 1 | 15552 | 7776  | ≥ 1 |
|         | 15 - 20  | 60 | 2 | 7 | 12 | QPSK | 1/4 | 4264 | 24 | 1 | 17280 | 8640  | ≥ 1 |
|         | 15 - 20  | 64 | 2 | 7 | 12 | QPSK | 1/4 | 4584 | 24 | 1 | 18432 | 9216  | ≥ 1 |
|         | 15 - 20  | 72 | 2 | 7 | 12 | QPSK | 1/4 | 5160 | 24 | 1 | 20736 | 10368 | ≥ 1 |
|         | 20   | 75 | 2 | 7 | 12 | QPSK | 1/5 | 4392 | 24 | 1 | 21600 | 10800 | ≥ 1 |
|         | 20   | 80 | 2 | 7 | 12 | QPSK | 1/5 | 4776 | 24 | 1 | 23040 | 11520 | ≥ 1 |
|         | 20   | 81 | 2 | 7 | 12 | QPSK | 1/5 | 4776 | 24 | 1 | 23328 | 11664 | ≥ 1 |
|         | 20   | 90 | 2 | 7 | 12 | QPSK | 1/6 | 4008 | 24 | 1 | 25920 | 12960 | ≥ 1 |
|         | 20   | 96 | 2 | 7 | 12 | QPSK | 1/6 | 4264 | 24 | 1 | 27648 | 13824 | ≥ 1 |
| 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: | As per Table 4.2-2 in TS 36.211 [7]  |    |   |   |    |      |     |      |    |   |       |       |     |
| NOTE 3: | As per Table 4.2-1 in TS 36.211 [7]  |    |   |   |    |      |     |      |    |   |       |       |     |

A.2.2.2.2 16-QAM

Table A.2.2.2.2-1: Reference Channels for 16QAM with partial RB allocation

| Parameter | Ch BW  | Allocated RBs | UL-DL Configuration (NOTE 2) | Special subframe configuration (NOTE 3) | DFT-OFDM Symbols per Sub-Frame | Mod'n | Target Coding rate | Payload size for Sub-Frame 2, 7 | Transport block CRC | Number of code blocks per Sub-Frame (NOTE 1) | Total number of bits per Sub-Frame for Sub-Frame 2, 7 | Total symbols per Sub-Frame for Sub-Frame 2, 7 | UE Category |
|-----------|--|---------------|------------------------------|---|--------------------------------|-------|--------------------|---------------------------------|---------------------|--|---|--|-------------|
| Unit      | MHz  |               |                              |   |                                |       |                    | Bits                            | Bits                |  | Bits  |  |             |
|           | 1.4 - 20   | 1             | 2                            | 7                                       | 12                             | 16QAM | 3/4                | 408                             | 24                  | 1  | 576   | 144  | ≥ 1         |
|           | 1.4 - 20   | 2             | 2                            | 7                                       | 12                             | 16QAM | 3/4                | 840                             | 24                  | 1  | 1152  | 288  | ≥ 1         |
|           | 1.4 - 20   | 3             | 2                            | 7                                       | 12                             | 16QAM | 3/4                | 1288                            | 24                  | 1  | 1728  | 432  | ≥ 1         |
|           | 1.4 - 20   | 4             | 2                            | 7                                       | 12                             | 16QAM | 3/4                | 1736                            | 24                  | 1  | 2304  | 576  | ≥ 1         |
|           | 1.4 - 20   | 5             | 2                            | 7                                       | 12                             | 16QAM | 3/4                | 2152                            | 24                  | 1  | 2880  | 720  | ≥ 1         |
|           | 3-20   | 6             | 2                            | 7                                       | 12                             | 16QAM | 3/4                | 2600                            | 24                  | 1  | 3456  | 864  | ≥ 1         |
|           | 3-20   | 8             | 2                            | 7                                       | 12                             | 16QAM | 3/4                | 3496                            | 24                  | 1  | 4608  | 1152   | ≥ 1         |
|           | 3-20   | 9             | 2                            | 7                                       | 12                             | 16QAM | 3/4                | 3880                            | 24                  | 1  | 5184  | 1296   | ≥ 1         |
|           | 3-20   | 10            | 2                            | 7                                       | 12                             | 16QAM | 3/4                | 4264                            | 24                  | 1  | 5760  | 1440   | ≥ 1         |
|           | 3-20   | 12            | 2                            | 7                                       | 12                             | 16QAM | 3/4                | 5160                            | 24                  | 1  | 6912  | 1728   | ≥ 1         |
|           | 5-20   | 15            | 2                            | 7                                       | 12                             | 16QAM | 1/2                | 4264                            | 24                  | 1  | 8640  | 2160   | ≥ 1         |
|           | 5-20   | 16            | 2                            | 7                                       | 12                             | 16QAM | 1/2                | 4584                            | 24                  | 1  | 9216  | 2304   | ≥ 1         |
|           | 5-20   | 18            | 2                            | 7                                       | 12                             | 16QAM | 1/2                | 5160                            | 24                  | 1  | 10368   | 2592   | ≥ 1         |
|           | 5-20   | 20            | 2                            | 7                                       | 12                             | 16QAM | 1/3                | 4008                            | 24                  | 1  | 11520   | 2880   | ≥ 1         |
|           | 5-20   | 24            | 2                            | 7                                       | 12                             | 16QAM | 1/3                | 4776                            | 24                  | 1  | 13824   | 3456   | ≥ 1         |
|           | 10-20  | 25            | 2                            | 7                                       | 12                             | 16QAM | 1/3                | 4968                            | 24                  | 1  | 14400   | 3600   | ≥ 1         |
|           | 10-20  | 27            | 2                            | 7                                       | 12                             | 16QAM | 1/3                | 4776                            | 24                  | 1  | 15552   | 3888   | ≥ 1         |
|           | 10-20  | 30            | 2                            | 7                                       | 12                             | 16QAM | 3/4                | 12960                           | 24                  | 3  | 17280   | 4320   | ≥ 2         |
|           | 10-20  | 32            | 2                            | 7                                       | 12                             | 16QAM | 3/4                | 13536                           | 24                  | 3  | 18432   | 4608   | ≥ 2         |
|           | 10-20  | 36            | 2                            | 7                                       | 12                             | 16QAM | 3/4                | 15264                           | 24                  | 3  | 20736   | 5184   | ≥ 2         |
|           | 10-20  | 40            | 2                            | 7                                       | 12                             | 16QAM | 3/4                | 16992                           | 24                  | 3  | 23040   | 5760   | ≥ 2         |
|           | 10-20  | 45            | 2                            | 7                                       | 12                             | 16QAM | 3/4                | 19080                           | 24                  | 4  | 25920   | 6480   | ≥ 2         |
|           | 10-20  | 48            | 2                            | 7                                       | 12                             | 16QAM | 3/4                | 20616                           | 24                  | 4  | 27648   | 6912   | ≥ 2         |
|           | 15 - 20  | 50            | 2                            | 7                                       | 12                             | 16QAM | 3/4                | 21384                           | 24                  | 4  | 28800   | 7200   | ≥ 2         |
|           | 15 - 20  | 54            | 2                            | 7                                       | 12                             | 16QAM | 3/4                | 22920                           | 24                  | 4  | 31104   | 7776   | ≥ 2         |
|           | 15 - 20  | 60            | 2                            | 7                                       | 12                             | 16QAM | 2/3                | 23688                           | 24                  | 4  | 34560   | 8640   | ≥ 2         |
|           | 15 - 20  | 64            | 2                            | 7                                       | 12                             | 16QAM | 2/3                | 25456                           | 24                  | 4  | 36864   | 9216   | ≥ 2         |
|           | 15 - 20  | 72            | 2                            | 7                                       | 12                             | 16QAM | 1/2                | 20616                           | 24                  | 4  | 41472   | 10368  | ≥ 2         |
|           | 20   | 75            | 2                            | 7                                       | 12                             | 16QAM | 1/2                | 21384                           | 24                  | 4  | 43200   | 10800  | ≥ 2         |
|           | 20   | 80            | 2                            | 7                                       | 12                             | 16QAM | 1/2                | 22920                           | 24                  | 4  | 46080   | 11520  | ≥ 2         |
|           | 20   | 81            | 2                            | 7                                       | 12                             | 16QAM | 1/2                | 22920                           | 24                  | 4  | 46656   | 11664  | ≥ 2         |
|           | 20   | 90            | 2                            | 7                                       | 12                             | 16QAM | 2/5                | 20616                           | 24                  | 4  | 51840   | 12960  | ≥ 2         |
|           | 20   | 96            | 2                            | 7                                       | 12                             | 16QAM | 2/5                | 22152                           | 24                  | 4  | 55296   | 13824  | ≥ 2         |
| 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:   | As per Table 4.2-2 in TS 36.211 [7]  |               |                              |   |                                |       |                    |                                 |                     |  |   |  |             |
| NOTE 3:   | As per Table 4.2-1 in TS 36.211 [7]  |               |                              |   |                                |       |                    |                                 |                     |  |   |  |             |

A.2.2.2.3 64-QAM

Table A.2.2.2.3-1: Reference Channels for 64-QAM with partial RB allocation

| Parameter | Ch BW    | Allocated RBs | UL-DL Configuration (NOTE 2) | Special subframe configuration (NOTE 3) | DFT-OFDM Symbols per Sub-Frame | Mod'n | Target Coding rate | Payload size for Sub-Frame 2, 7 | Transport block CRC | Number of code blocks per Sub-Frame (NOTE 1) | Total number of bits per Sub-Frame for Sub-Frame 2, 7 | Total symbols per Sub-Frame for Sub-Frame 2, 7 | UE Category (NOTE 4) |
|-----------|----------|---------------|------------------------------|---|--------------------------------|-------|--------------------|---------------------------------|---------------------|--|---|--|----------------------|
| Unit      | MHz      |               |                              |   |                                |       |                    | Bits                            | Bits                |  | Bits  |  |                      |
|           | 1.4 - 20 | 1             | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 616                             | 24                  | 1  | 864   | 144  | 5,8                  |
|           | 1.4 - 20 | 2             | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 1256                            | 24                  | 1  | 1728  | 288  | 5,8                  |
|           | 1.4 - 20 | 3             | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 1864                            | 24                  | 1  | 2592  | 432  | 5,8                  |
|           | 1.4 - 20 | 4             | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 2536                            | 24                  | 1  | 3456  | 576  | 5,8                  |
|           | 1.4 - 20 | 5             | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 3112                            | 24                  | 1  | 4320  | 720  | 5,8                  |
|           | 3-20     | 6             | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 3752                            | 24                  | 1  | 5184  | 864  | 5,8                  |
|           | 3-20     | 8             | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 5160                            | 24                  | 1  | 6912  | 1152   | 5,8                  |
|           | 3-20     | 9             | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 5736                            | 24                  | 1  | 7776  | 1296   | 5,8                  |
|           | 3-20     | 10            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 6200                            | 24                  | 2  | 8640  | 1440   | 5,8                  |
|           | 3-20     | 12            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 7480                            | 24                  | 2  | 10368   | 1728   | 5,8                  |
|           | 5-20     | 15            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 9528                            | 24                  | 2  | 12960   | 2160   | 5,8                  |
|           | 5-20     | 16            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 10296                           | 24                  | 2  | 13824   | 2304   | 5,8                  |
|           | 5-20     | 18            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 11448                           | 24                  | 2  | 15552   | 2592   | 5,8                  |
|           | 5-20     | 20            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 12576                           | 24                  | 3  | 17280   | 2880   | 5,8                  |
|           | 5-20     | 24            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 15264                           | 24                  | 3  | 20736   | 3456   | 5,8                  |
|           | 10-20    | 25            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 15840                           | 24                  | 3  | 21600   | 3600   | 5,8                  |
|           | 10-20    | 27            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 16992                           | 24                  | 3  | 23328   | 3888   | 5,8                  |
|           | 10-20    | 30            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 19080                           | 24                  | 4  | 25920   | 4320   | 5,8                  |
|           | 10-20    | 32            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 20616                           | 24                  | 4  | 27648   | 4608   | 5,8                  |
|           | 10-20    | 36            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 22920                           | 24                  | 4  | 31104   | 5184   | 5,8                  |
|           | 10-20    | 40            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 25456                           | 24                  | 5  | 34560   | 5760   | 5,8                  |
|           | 10-20    | 45            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 28336                           | 24                  | 5  | 38880   | 6480   | 5,8                  |
|           | 10-20    | 48            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 30576                           | 24                  | 5  | 41472   | 6912   | 5,8                  |
|           | 15 - 20  | 50            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 31704                           | 24                  | 6  | 43200   | 7200   | 5,8                  |
|           | 15 - 20  | 54            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 34008                           | 24                  | 6  | 46656   | 7776   | 5,8                  |
|           | 15 - 20  | 60            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 37888                           | 24                  | 7  | 51840   | 8640   | 5,8                  |
|           | 15 - 20  | 64            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 40576                           | 24                  | 7  | 55296   | 9216   | 5,8                  |
|           | 1.4 - 20 | 1             | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 616                             | 24                  | 1  | 864   | 144  | 5,8                  |
|           | 1.4 - 20 | 2             | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 1256                            | 24                  | 1  | 1728  | 288  | 5,8                  |
|           | 1.4 - 20 | 3             | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 1864                            | 24                  | 1  | 2592  | 432  | 5,8                  |
|           | 1.4 - 20 | 4             | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 2536                            | 24                  | 1  | 3456  | 576  | 5,8                  |
|           | 1.4 - 20 | 5             | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 3112                            | 24                  | 1  | 4320  | 720  | 5,8                  |
|           | 3-20     | 6             | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 3752                            | 24                  | 1  | 5184  | 864  | 5,8                  |
|           | 3-20     | 8             | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 5160                            | 24                  | 1  | 6912  | 1152   | 5,8                  |
|           | 3-20     | 9             | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 5736                            | 24                  | 1  | 7776  | 1296   | 5,8                  |
|           | 3-20     | 10            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 6200                            | 24                  | 2  | 8640  | 1440   | 5,8                  |
|           | 3-20     | 12            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 7480                            | 24                  | 2  | 10368   | 1728   | 5,8                  |
|           | 5-20     | 15            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 9528                            | 24                  | 2  | 12960   | 2160   | 5,8                  |
|           | 5-20     | 16            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 10296                           | 24                  | 2  | 13824   | 2304   | 5,8                  |
|           | 5-20     | 18            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 11448                           | 24                  | 2  | 15552   | 2592   | 5,8                  |
|           | 5-20     | 20            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 12576                           | 24                  | 3  | 17280   | 2880   | 5,8                  |
|           | 5-20     | 24            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 15264                           | 24                  | 3  | 20736   | 3456   | 5,8                  |
|           | 10-20    | 25            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 15840                           | 24                  | 3  | 21600   | 3600   | 5,8                  |
|           | 10-20    | 27            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 16992                           | 24                  | 3  | 23328   | 3888   | 5,8                  |
|           | 10-20    | 30            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 19080                           | 24                  | 4  | 25920   | 4320   | 5,8                  |
|           | 15 - 20  | 50            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 31704                           | 24                  | 6  | 43200   | 7200   | 5,8                  |
|           | 15 - 20  | 54            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 34008                           | 24                  | 6  | 46656   | 7776   | 5,8                  |
|           | 15 - 20  | 60            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 37888                           | 24                  | 7  | 51840   | 8640   | 5,8                  |
|           | 15 - 20  | 64            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 40576                           | 24                  | 7  | 55296   | 9216   | 5,8                  |
|           | 15 - 20  | 72            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 45352                           | 24                  | 8  | 62208   | 10368  | 5,8                  |
|           | 20       | 75            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 46888                           | 24                  | 8  | 64800   | 10800  | 5,8                  |
|           | 20       | 80            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 51024                           | 24                  | 9  | 69120   | 11520  | 5,8                  |
|           | 20       | 81            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 51024                           | 24                  | 9  | 69984   | 11664  | 5,8                  |
|           | 20       | 90            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 51024                           | 24                  | 9  | 77760   | 12960  | 5,8                  |
|           | 20       | 96            | 2                            | 7                                       | 12                             | 64QAM | 3/4                | 61664                           | 24                  | 11   | 82944   | 13824  | 5,8                  |

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: As per Table 4.2-2 in TS 36.211 [7].  
 NOTE 3: As per Table 4.2-1 in TS 36.211 [7]  
 NOTE 4: If UE does not report UE UL category, then the applicability of reference channel is determined by UE category. If UE reports UE UL category, then the applicability of reference channel is determined by UE UL category

A.2.2.2.4 256 QAM

Table A.2.2.2.4-1: Reference Channels for 256 QAM with partial RB allocation

| Parameter | Ch BW    | Allocated RBs | UL-DL Configuration (NOTE 2) | Special Slot Configuration (NOTE 3) | DFT-OFDM Symbols per Sub-Frame | Mod'n  | Target Coding rate | Payload size for Sub-Frame 2, 7 | Transport block CRC | Number of code blocks per Sub-Frame (NOTE 1) | Total number of bits per Sub-Frame for Sub-Frame 2, 7 | Total symbols per Sub-Frame for Sub-Frame 2, 7 | UE UL Category |
|-----------|----------|---------------|------------------------------|-------------------------------------|--------------------------------|--------|--------------------|---------------------------------|---------------------|--|---|--|----------------|
| Unit      | MHz      |               |                              |                                     |                                |        |                    | Bits                            | Bits                |  | Bits  |  |                |
|           | 1.4 - 20 | 1             | 2                            | 7                                   | 12                             | 256QAM | 3/4                | 840                             | 24                  | 1  | 1152  | 144  | ≥ 15           |
|           | 1.4 - 20 | 2             | 2                            | 7                                   | 12                             | 256QAM | 3/4                | 1672                            | 24                  | 1  | 2304  | 288  | ≥ 15           |
|           | 1.4 - 20 | 3             | 2                            | 7                                   | 12                             | 256QAM | 3/4                | 2536                            | 24                  | 1  | 3456  | 432  | ≥ 15           |
|           | 1.4 - 20 | 4             | 2                            | 7                                   | 12                             | 256QAM | 3/4                | 3368                            | 24                  | 1  | 4608  | 576  | ≥ 15           |
|           | 1.4 - 20 | 5             | 2                            | 7                                   | 12                             | 256QAM | 3/4                | 4264                            | 24                  | 1  | 5760  | 720  | ≥ 15           |
|           | 3-20     | 6             | 2                            | 7                                   | 12                             | 256QAM | 3/4                | 5160                            | 24                  | 1  | 6912  | 864  | ≥ 15           |
|           | 3-20     | 8             | 2                            | 7                                   | 12                             | 256QAM | 3/4                | 6712                            | 24                  | 2  | 9216  | 1152   | ≥ 15           |
|           | 3-20     | 9             | 2                            | 7                                   | 12                             | 256QAM | 3/4                | 7736                            | 24                  | 2  | 10368   | 1296   | ≥ 15           |
|           | 3-20     | 10            | 2                            | 7                                   | 12                             | 256QAM | 3/4                | 8504                            | 24                  | 2  | 11520   | 1440   | ≥ 15           |
|           | 3-20     | 12            | 2                            | 7                                   | 12                             | 256QAM | 3/4                | 10296                           | 24                  | 2  | 13824   | 1728   | ≥ 15           |
|           | 5-20     | 15            | 2                            | 7                                   | 12                             | 256QAM | 3/4                | 12960                           | 24                  | 3  | 17280   | 2160   | ≥ 15           |
|           | 5-20     | 16            | 2                            | 7                                   | 12                             | 256QAM | 3/4                | 13536                           | 24                  | 3  | 18432   | 2304   | ≥ 15           |
|           | 5-20     | 18            | 2                            | 7                                   | 12                             | 256QAM | 3/4                | 15264                           | 24                  | 3  | 20736   | 2592   | ≥ 15           |
|           | 5-20     | 20            | 2                            | 7                                   | 12                             | 256QAM | 3/4                | 16992                           | 24                  | 3  | 23040   | 2880   | ≥ 15           |
|           | 5-20     | 24            | 2                            | 7                                   | 12                             | 256QAM | 3/4                | 20616                           | 24                  | 4  | 27648   | 3456   | ≥ 15           |
|           | 10-20    | 25            | 2                            | 7                                   | 12                             | 256QAM | 3/4                | 21384                           | 24                  | 4  | 28800   | 3600   | ≥ 15           |
|           | 10-20    | 27            | 2                            | 7                                   | 12                             | 256QAM | 3/4                | 22920                           | 24                  | 4  | 31104   | 3888   | ≥ 15           |
|           | 10-20    | 30            | 2                            | 7                                   | 12                             | 256QAM | 3/4                | 25456                           | 24                  | 5  | 34560   | 4320   | ≥ 15           |
|           | 10-20    | 32            | 2                            | 7                                   | 12                             | 256QAM | 3/4                | 27376                           | 24                  | 5  | 36864   | 4608   | ≥ 15           |
|           | 10-20    | 36            | 2                            | 7                                   | 12                             | 256QAM | 3/4                | 30576                           | 24                  | 6  | 41472   | 5184   | ≥ 15           |
|           | 10-20    | 40            | 2                            | 7                                   | 12                             | 256QAM | 3/4                | 34008                           | 24                  | 6  | 46080   | 5760   | ≥ 15           |
|           | 10-20    | 45            | 2                            | 7                                   | 12                             | 256QAM | 3/4                | 37888                           | 24                  | 7  | 51840   | 6480   | ≥ 15           |
|           | 10-20    | 48            | 2                            | 7                                   | 12                             | 256QAM | 3/4                | 40576                           | 24                  | 8  | 55296   | 6912   | ≥ 15           |
|           | 15 - 20  | 50            | 2                            | 7                                   | 12                             | 256QAM | 3/4                | 42368                           | 24                  | 8  | 57600   | 7200   | ≥ 15           |
|           | 15 - 20  | 54            | 2                            | 7                                   | 12                             | 256QAM | 3/4                | 46888                           | 24                  | 8  | 62208   | 7776   | ≥ 15           |
|           | 15 - 20  | 60            | 2                            | 7                                   | 12                             | 256QAM | 3/4                | 51024                           | 24                  | 9  | 69120   | 8640   | ≥ 15           |
|           | 15 - 20  | 64            | 2                            | 7                                   | 12                             | 256QAM | 3/4                | 55056                           | 24                  | 9  | 73728   | 9216   | ≥ 15           |
|           | 15 - 20  | 72            | 2                            | 7                                   | 12                             | 256QAM | 3/4                | 61664                           | 24                  | 11   | 82944   | 10368  | ≥ 15           |
|           | 20       | 75            | 2                            | 7                                   | 12                             | 256QAM | 3/4                | 63776                           | 24                  | 11   | 86400   | 10800  | ≥ 15           |
|           | 20       | 80            | 2                            | 7                                   | 12                             | 256QAM | 3/4                | 68808                           | 24                  | 12   | 92160   | 11520  | ≥ 15           |
|           | 20       | 81            | 2                            | 7                                   | 12                             | 256QAM | 3/4                | 68808                           | 24                  | 12   | 93312   | 11664  | ≥ 15           |
|           | 20       | 90            | 2                            | 7                                   | 12                             | 256QAM | 3/4                | 76208                           | 24                  | 13   | 103680  | 12960  | ≥ 15           |
|           | 20       | 96            | 2                            | 7                                   | 12                             | 256QAM | 3/4                | 81176                           | 24                  | 14   | 110592  | 13824  | ≥ 15           |

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: As per Table 4.2-2 in TS 36.211 [7]  
 NOTE 3: As per Table 4.2-1 in TS 36.211 [7]

## A.3 DL reference measurement channels for E-UTRA

### A.3.1 General

The number of available channel bits varies across the sub-frames due to PBCH and PSS/SSS overhead. The payload size per sub-frame is varied in order to keep the code rate constant throughout a frame.

Unless otherwise stated, no user data is scheduled on subframes #5 in order to facilitate the transmission of system information blocks (SIB).

The algorithm for determining the payload size  $A$  is as follows; given a desired coding rate  $R$  and radio block allocation  $N_{RB}$

1. Calculate the number of channel bits  $N_{ch}$  that can be transmitted during the first transmission of a given sub-frame.
2. Find  $A$  such that the resulting coding rate is as close to  $R$  as possible, that is,

$$\min \left\{ R - (A + 24 * (N_{CB} + 1)) / N_{ch}, \text{ where } N_{CB} = \begin{cases} 0, & \text{if } C = 1 \\ C, & \text{if } C > 1 \end{cases} \right.$$

subject to

- a) A is a valid TB size according to clause 7.1.7 of TS 36.213 [6] assuming an allocation of  $N_{RB}$  resource blocks.
- b) C is the number of Code Blocks calculated according to clause 5.1.2 of TS 36.212 [5].
- 3. If there is more than one A that minimizes the equation above, then the larger value is chosen per default and the chosen code rate should not exceed 0.93.
- 4. For TDD, the measurement channel is based on DL/UL configuration ratio of 3DL+DwPTS (10 OFDM symbol SSF7): 1UL

### A.3.1.1 QPSK

**Table A.3.1.1-1: Fixed Reference Channel for Receiver Requirements (TDD)**

| Parameter   | Unit      | Value |      |      |        |        |        |
|---|-----------|-------|------|------|--------|--------|--------|
|   |           | 1.4   | 3    | 5    | 10     | 15     | 20     |
| Channel Bandwidth   | MHz       | 1.4   | 3    | 5    | 10     | 15     | 20     |
| Allocated resource blocks   |           | 6     | 15   | 25   | 50     | 75     | 100    |
| Uplink-Downlink Configuration (NOTE 5)  |           | 2     | 2    | 2    | 2      | 2      | 2      |
| Special subframe configuration (NOTE 6)   |           | 7     | 7    | 7    | 7      | 7      | 7      |
| Allocated subframes per Radio Frame (D+S)   |           | 3     | 3+2  | 3+2  | 3+2    | 3+2    | 3+2    |
| Number of HARQ Processes  | Processes | 7     | 7    | 7    | 7      | 7      | 7      |
| Maximum number of HARQ transmission   |           | 1     | 1    | 1    | 1      | 1      | 1      |
| Modulation  |           | QPSK  | QPSK | QPSK | QPSK   | QPSK   | QPSK   |
| Target coding rate  |           | 1/3   | 1/3  | 1/3  | 1/3    | 1/3    | 1/3    |
| Information Bit Payload per Sub-Frame   | Bits      |       |      |      |        |        |        |
| For Sub-Frame 3, 4, 8, 9  |           | 408   | 1320 | 2216 | 4392   | 6712   | 8760   |
| For Sub-Frame 1, 6  |           | N/A   | 776  | 1288 | 2664   | 4008   | 5352   |
| For Sub-Frame 5   |           | N/A   | N/A  | N/A  | N/A    | N/A    | N/A    |
| For Sub-Frame 0   |           | 208   | 1064 | 1800 | 4392   | 6712   | 8760   |
| Transport block CRC   | Bits      | 24    | 24   | 24   | 24     | 24     | 24     |
| Number of Code Blocks per Sub-Frame (NOTE 4)  |           |       |      |      |        |        |        |
| For Sub-Frame 3, 4, 8, 9  |           | 1     | 1    | 1    | 1      | 2      | 2      |
| For Sub-Frame 1, 6  |           | N/A   | 1    | 1    | 1      | 1      | 1      |
| For Sub-Frame 5   |           | N/A   | N/A  | N/A  | N/A    | N/A    | N/A    |
| For Sub-Frame 0   |           | 1     | 1    | 1    | 1      | 2      | 2      |
| Binary Channel Bits Per Sub-Frame   | Bits      |       |      |      |        |        |        |
| For Sub-Frame 3, 4, 8, 9  |           | 1368  | 3780 | 6300 | 13800  | 20700  | 27600  |
| For Sub-Frame 1, 6  |           | N/A   | 2616 | 4456 | 9056   | 13656  | 18256  |
| For Sub-Frame 5   |           | N/A   | N/A  | N/A  | N/A    | N/A    | N/A    |
| For Sub-Frame 0   |           | 672   | 3084 | 5604 | 13104  | 20004  | 26904  |
| Max. Throughput averaged over 1 frame   | kbps      | 102.4 | 564  | 932  | 1965.6 | 3007.2 | 3970.4 |
| UE Category   |           | ≥ 1   | ≥ 1  | ≥ 1  | ≥ 1    | ≥ 1    | ≥ 1    |
| NOTE 1: For normal subframes(0,3,4,5,8,9), 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz. For special subframe (1&6), only 2 OFDM symbols are allocated to PDCCH for all BWs. |           |       |      |      |        |        |        |
| NOTE 2: For 1.4MHz, no data shall be scheduled on special subframes(1&6) to avoid problems with insufficient PDCCH performance  |           |       |      |      |        |        |        |
| NOTE 3: Reference signal, Synchronization signals and PBCH allocated as per TS 36.211 [7]   |           |       |      |      |        |        |        |
| NOTE 4: 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 5: As per Table 4.2-2 in TS 36.211 [7]   |           |       |      |      |        |        |        |
| NOTE 6: As per Table 4.2-1 in TS 36.211 [7]   |           |       |      |      |        |        |        |

### A.3.1.2 64-QAM

**Table A.3.1.2-1: Fixed Reference Channel for Maximum input level for UE Categories  $\geq 3$  (TDD)**

| Parameter   | Unit      | Value         |               |               |               |               |               |
|---|-----------|---------------|---------------|---------------|---------------|---------------|---------------|
|   |           | 1.4           | 3             | 5             | 10            | 15            | 20            |
| Channel bandwidth   | MHz       | 1.4           | 3             | 5             | 10            | 15            | 20            |
| Allocated resource blocks   |           | 6             | 15            | 25            | 50            | 75            | 100           |
| Subcarriers per resource block  |           | 12            | 12            | 12            | 12            | 12            | 12            |
| Uplink-Downlink Configuration (NOTE 5)  |           | 2             | 2             | 2             | 2             | 2             | 2             |
| Special subframe configuration (NOTE 6)   |           | 7             | 7             | 7             | 7             | 7             | 7             |
| Allocated subframes per Radio Frame   |           | 2             | 3+2           | 3+2           | 3+2           | 3+2           | 3+2           |
| Modulation  |           | 64QAM         | 64QAM         | 64QAM         | 64QAM         | 64QAM         | 64QAM         |
| Target Coding Rate  |           | $\frac{3}{4}$ | $\frac{3}{4}$ | $\frac{3}{4}$ | $\frac{3}{4}$ | $\frac{3}{4}$ | $\frac{3}{4}$ |
| Number of HARQ Processes  | Processes | 7             | 7             | 7             | 7             | 7             | 7             |
| Maximum number of HARQ transmissions  |           | 1             | 1             | 1             | 1             | 1             | 1             |
| Information Bit Payload per Sub-Frame   |           |               |               |               |               |               |               |
| For Sub-Frames 3, 4, 8, 9   | Bits      | 2984          | 8504          | 14112         | 30576         | 46888         | 61664         |
| For Sub-Frames 1,6  | Bits      | N/A           | 5544          | 9528          | 19848         | 30576         | 40576         |
| For Sub-Frame 5   | Bits      | N/A           | N/A           | N/A           | N/A           | N/A           | N/A           |
| For Sub-Frame 0   | Bits      | N/A           | 6968          | 12576         | 30576         | 45352         | 61664         |
| Transport block CRC   | Bits      | 24            | 24            | 24            | 24            | 24            | 24            |
| Number of Code Blocks per Sub-Frame (NOTE 4)  |           |               |               |               |               |               |               |
| For Sub-Frames 3, 4, 8, 9   |           | 1             | 2             | 3             | 5             | 8             | 11            |
| For Sub-Frames 1,6  |           | N/A           | 2             | 2             | 4             | 6             | 8             |
| For Sub-Frame 5   |           | N/A           | N/A           | N/A           | N/A           | N/A           | N/A           |
| For Sub-Frame 0   |           | N/A           | 2             | 3             | 5             | 8             | 11            |
| Binary Channel Bits per Sub-Frame   |           |               |               |               |               |               |               |
| For Sub-Frames 3, 4, 8, 9   | Bits      | 4104          | 11340         | 18900         | 41400         | 62100         | 82800         |
| For Sub-Frames 1,6  |           | N/A           | 7848          | 13368         | 27168         | 40968         | 54768         |
| For Sub-Frame 5   | Bits      | N/A           | N/A           | N/A           | N/A           | N/A           | N/A           |
| For Sub-Frame 0   | Bits      | N/A           | 9252          | 16812         | 39312         | 60012         | 80712         |
| Max. Throughput averaged over 1 frame   | kbps      | 596.8         | 3791.2        | 6369.6        | 13910         | 20945         | 27877         |
| NOTE 1: For normal subframes(0,3,4,5,8,9), 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz. For special subframe (1&6), only 2 OFDM symbols are allocated to PDCCH for all BWs. |           |               |               |               |               |               |               |
| NOTE 2: For 1.4MHz, no data shall be scheduled on special subframes(1&6) to avoid problems with insufficient PDCCH performance.   |           |               |               |               |               |               |               |
| NOTE 3: Reference signal, Synchronization signals and PBCH allocated as per TS 36.211 [7].  |           |               |               |               |               |               |               |
| NOTE 4: 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 5: As per Table 4.2-2 in TS 36.211 [7].  |           |               |               |               |               |               |               |
| NOTE 6: As per Table 4.2-1 in TS 36.211 [7]   |           |               |               |               |               |               |               |

### A.3.1.3 256-QAM

**Table A.3.1.3-1: Fixed Reference Channel for Maximum input level for UE Categories 11/12 and UE DL categories  $\geq 11$  (TDD)**

| Parameter                               | Unit      | Value  |        |        |        |        |        |
|---|-----------|--------|--------|--------|--------|--------|--------|
|   |           | 1.4    | 3      | 5      | 10     | 15     | 20     |
| Channel bandwidth                       | MHz       | 1.4    | 3      | 5      | 10     | 15     | 20     |
| Allocated resource blocks               |           | 6      | 15     | 25     | 50     | 75     | 100    |
| Subcarriers per resource block          |           | 12     | 12     | 12     | 12     | 12     | 12     |
| Uplink-Downlink Configuration (NOTE 5)  |           | 2      | 2      | 2      | 2      | 2      | 2      |
| Special subframe configuration (NOTE 6) |           | 7      | 7      | 7      | 7      | 7      | 7      |
| Allocated subframes per Radio Frame     |           | 2      | 3+2    | 3+2    | 3+2    | 3+2    | 3+2    |
| Modulation                              |           | 256QAM | 256QAM | 256QAM | 256QAM | 256QAM | 256QAM |
| Target Coding Rate                      |           | 4/5    | 4/5    | 4/5    | 4/5    | 4/5    | 4/5    |
| Number of HARQ Processes                | Processes | 7      | 7      | 7      | 7      | 7      | 7      |
| Maximum number of HARQ transmissions    |           | 1      | 1      | 1      | 1      | 1      | 1      |
| Information Bit Payload per Sub-Frame   |           |        |        |        |        |        |        |
| For Sub-Frames 3,4,8,9                  | Bits      | 4392   | 12216  | 19848  | 42368  | 63776  | 84760  |
| For Sub-Frames 1,6                      | Bits      | N/A    | 10464  | 17824  | 36224  | 54624  | 73024  |

|   |      |       |        |       |         |       |         |
|---|------|-------|--------|-------|---------|-------|---------|
| For Sub-Frame 5   | Bits | N/A   | N/A    | N/A   | N/A     | N/A   | N/A     |
| For Sub-Frame 0   | Bits | N/A   | 9912   | 17568 | 42368   | 63776 | 84760   |
| Transport block CRC   | Bits | 24    | 24     | 24    | 24      | 24    | 24      |
| Number of Code Blocks per Sub-Frame (NOTE 4)  |      |       |        |       |         |       |         |
| For Sub-Frames 3,4,8,9  |      | 1     | 2      | 4     | 7       | 11    | 14      |
| For Sub-Frames 1,6  |      | N/A   | 2      | 3     | 6       | 9     | 13      |
| For Sub-Frame 5   |      | N/A   | N/A    | N/A   | N/A     | N/A   | N/A     |
| For Sub-Frame 0   |      | N/A   | 2      | 3     | 7       | 11    | 14      |
| Binary Channel Bits per Sub-Frame   |      |       |        |       |         |       |         |
| For Sub-Frames 3,4,8,9  | Bits | 5472  | 15120  | 25200 | 55200   | 82800 | 110400  |
| For Sub-Frames 1,6  |      | N/A   | 8248   | 13536 | 27376   | 40576 | 55056   |
| For Sub-Frame 5   | Bits | N/A   | N/A    | N/A   | N/A     | N/A   | N/A     |
| For Sub-Frame 0   | Bits | N/A   | 12336  | 22416 | 52416   | 80016 | 107616  |
| Max. Throughput averaged over 1 frame   | kbps | 878.4 | 5570.4 | 9240  | 20049.6 | 30144 | 40503.2 |
| <p>NOTE 1: For normal subframes(0,3,4,5,8,9), 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz. For special subframe (1&amp;6), only 2 OFDM symbols are allocated to PDCCH for all BWs.</p> <p>NOTE 2: For 1.4MHz, no data shall be scheduled on special subframes(1&amp;6) to avoid problems with insufficient PDCCH performance.</p> <p>NOTE 3: Reference signal, Synchronization signals and PBCH allocated as per TS 36.211 [7].</p> <p>NOTE 4: 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).</p> <p>NOTE 5: As per Table 4.2-2 in TS 36.211 [7].</p> <p>NOTE 6: As per Table 4.2-1 in TS 36.211 [7]</p> |      |       |        |       |         |       |         |

## Annex B: Void



## Annex C: Void

## Annex D: Void

## Annex E: Void

## Annex F: Void

## Annex G: Void

## Annex H (normative): Modified MPR behavior

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## Annex I (normative): Dual uplink interferer

UE is mandated to support operation in dual and triple uplink mode for EN-DC configuration in NR FR1 listed in Table 5.5B.2-1, Table 5.5B.3-1, and Table 5.5B.4.1-1 and indicated by column single uplink allowed, Table 7.3B.2.3.5.1-1, Table 7.3B.2.3.5.2-0, Table 7.3B.2.3.5.2-1 or NE-DC configuration in NR FR1 listed in Table 5.5B.4a.1-1 and indicated by column single uplink allowed if the intermodulation products caused by the dual uplink operation do not interfere with its own primary downlink transmission channel bandwidth of PCell or PSCell. For intermodulation products falling into any secondary downlink channel bandwidth, UE single UL capability is not considered.

Formula for determining if the EN-DC in NR FR1 configuration with dual uplink operation interferes with its own downlink reception.

Interference bandwidth:  $IBW = |a| * CBW1 + |b| * CBW2$

- $|a| + |b| = 2$  (or 3)
- CBW1 and CBW2 are the transmission bandwidth configurations of the UL channels

Center frequency of IBW:  $f_{IBW} = |a * f1 + b * f2|$

- f1 and f2 are center frequency of the transmission bandwidth configurations of each UL channel

The range of IMD 2 (or 3):  $[f_{IBW} - IBW/2, f_{IBW} + IBW/2]$

NOTE 1: UE shall be able to apply operations which are configured by RRC reconfiguration and corresponding HARQ timing on the transmission bandwidth.

NOTE 2: For identified difficult band combination, during two adjacent RRC reconfiguration, the changing of transmission bandwidth should not introduce IM2 and IM3, which will result in UE changing from 2Tx to 1Tx. Otherwise, UE behavior is not specified.

For DC\_3A\_n3A intra-band non-contiguous EN-DC combination, only single switched UL is supported in Rel-15.

## Annex J: Void



## Annex K: Void

## Annex L (informative): Change history

| Change history |                |            |      |     |     |  |             |
|----------------|----------------|------------|------|-----|-----|--|-------------|
| Date           | Meeting        | TDoc       | CR   | Rev | Cat | Subject/Comment  | New version |
| 2017-08        | RAN4#84        |            |      |     |     | Initial Skeleton   | 0.0.1       |
| 2017-11        | RAN4#84<br>Bis | R4-1711980 |      |     |     | Number TPs from editors  | 0.1.0       |
| 2017-12        | RAN4#85        | R4-1713807 |      |     |     | Approved TPs in RAN4#85<br>R4-1714444, CA BW classes, TP, Ericsson<br>R4-1714170, How to list DC configurations into TS 38.101-3, Nokia<br>R4-1714530, TP on introducing operating bands for NR-LTE DC including SUL band combinations in 38.101-3, Qualcomm<br>R4-1714098, TP to TS 38.101-3: UE RF requirements for non-standalone SUL, Huawei<br>R4-1713206, TP on general parts for 38.101-3 NR interwork, Ericsson<br>R4-1714443, TP to TS 38.101-3: On dual uplink operation for EN-DC in NR FR1 and single uplink, Nokia<br>R4-1714450, TP to 38.101-3: maximum output power and unwanted emissions for EN-DC, Ericsson<br>R4-1714346, TP to 38.101-3: REFSENS for intra-band EN-DC, Ericsson<br>R4-1714345, TP for TS 36.101-3: clause 7 receiver requirements, Huawei<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                                       | 0.2.0       |
| 2017-12        | RAN4#85        | R4-1714571 |      |     |     | Further corrections after email review   | 0.3.0       |
| 2017-12        | RAN#78         | RP-172477  |      |     |     | v1.0.0 submitted for plenary approval. Contents same as 0.3.0  | 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  | 0005 |     | F   | Implementation of endorsed CRs to 38.101-3<br>Endorsed draft CR<br>F: R4-1801267, Draft CR on UE RF requirements for SUL in TS 38.101-3, Huawei<br>B: R4-1801111, Draft CR for completed LTE 1CC + NR 1band for TS 38.101-3, NTT DOCOMO, INC.<br>B: R4-1800716, Draft CR for introduction of completed band combinations from 37.863-03-01 into 38.101-3, Ericsson<br>B: R4-1800063, Draft CR for completed EN-DC of LTE 4CC + NR 1band for TS 38.101-3, Nokia<br>B: R4-1800717, Draft CR for introduction of completed band combinations from 37.865-01-01 into 38.101-3, Ericsson<br>F: R4-1800049, Modification for TS38.101-3, CATT<br>F: R4-1800287, 38.101-3 DC_(n)71B draft CR for section 6.2.4.1 - A-MPR for intra-band EN-DC - NS value, T-Mobile USA Inc.<br>F: R4-1800288, 38.101-3 DC_(n)71B draft CR for section 7.3.3 Reference sensitivity for DC_(n)71B - MSD values, T-Mobile USA Inc.<br>F: R4-1801139 Draft CR to 38.101-3: MSD for inter-band EN-DC, Ericsson | 15.1.0      |
| 2018-06        | RAN#80         | RP-181374  | 0013 | 1   | F   | CR to TS 38.101-3: Implementation of endorsed draft CRs from RAN4 #87<br><b>Missing figures (Figure 6.3B.1.1-1, Figure 6.3B.1.1-2, Figure 6.3B.1.1-3 and Figure 6.3B.1.1-4) from the endorsed draftCR (R4-1807235) were added during the CR implementation.</b>  | 15.2.0      |
| 2018-09        | RAN#81         | RP-182129  | 0020 | 2   | F   | Big CR for 38.101-3<br><br>Draft CRs from RAN4#88:<br>R4-1809960 Draft CR to TS 38.101-3: to introduce new NR inter-band DC band combinations Samsung,KDDI,SKT,KT,LGU+<br>R4-1809991 CR to 38.101-3:Corrections on UE coexistence table for Table 6.5B.3.3.1-1 MediaTek Inc.<br>R4-1810054 Pcmx for Rel-15 inter-band EN-DC for FR1 and NR in FR2 InterDigital, Inc.<br>R4-1810111 Single UL allowed corrections for DC_28A-n51A EN-DC in 38.101-3 Skyworks Solutions Inc.   | 15.3.0      |

|         |        |           |      |   |   |        |
|---------|--------|-----------|------|---|---|--------|
|         |        |           |      |   | <p>R4-1810125 Draft CR to 38.101-3 Single UL allowed corrections for DC_28A_51A EN-DC Skyworks Solutions Inc.</p> <p>R4-1810128 Draft CR to 38.101-3 Single UL allowed corrections for EN-DC operation in NR FR1 (two bands) Skyworks Solutions Inc.</p> <p>R4-1810167 TP for TR 37.863-01-01: MSD for DC_5A_n78A due to the 4th harmonic MediaTek Inc.</p> <p>R4-1810410 Draft CR to 38.101-3: Corrections on symbols and abbreviations in section 3 ZTE Corporation</p> <p>R4-1810417 Correction to DC_(n)71B MSD definition Nokia</p> <p>R4-1810433 Correction on EN-DC 8A_n79A SoftBank Corp., ZTE</p> <p>R4-1810476 Draft CR to TS 38.101-3 correction for DC_3_n3-n77, DC_3_n3-n78 CHTTL</p> <p>R4-1810976 Annex lettering change for 38.101-3 Qualcomm Incorporated</p> <p>R4-1811461 Clarification and corrections of EN-DC REFSENS exceptions requirement Nokia, Nokia Shanghai Bell</p> <p>R4-1811462 Correction to DC_(n)71B scs restriction for NR Nokia</p> <p>R4-1811466 EN DC_41-79 CATT</p> <p>R4-1811467 Draft CR TS 38.101-3 Corrections to Single UL Allowed Criteria for Mid-Band EN-DC in FR1 Skyworks Solutions Inc.</p> <p>R4-1811484 Pcmx for inter-band EN-DC FR1 draft CR InterDigital, Inc.</p> <p>R4-1811525 Draft CR TS 38.101-3 on missing requirements for FR1 EN-DC Skyworks Solutions, Inc.</p> <p>R4-1811542 Draft CR to 38.101-3 on correction on some errors Huawei, HiSilicon</p> <p>R4-1811796 Draft CR to 38.101-3 Corrections to Single UL allowed criteria for EN-DC Skyworks Solutions Inc.</p> <p>R4-1811800 DRAFT CR for PCmax FR2 correction Qualcomm Incorporated</p> <p>R4-1811810 Draft CR TS 38.101-3: Corrections for B41/n41 SPRINT Corporation</p>  |        |
| 2018-12 | RAN#82 | RP-182359 | 0030 | F | <p>Endorced draft CRs from RAN4#88Bis :</p> <p>R4-1812057, Introduction of Intra-band contiguous EN-DC bandwidth classes, Nokia</p> <p>R4-1812290 Draft CR on MSD for EN-DC including Band 66 and n78 Huawei, HiSilicon</p> <p>R4-1812293 Draft CR on switching time mask for EN-DC Huawei, HiSilicon</p> <p>R4-1812298 Draft CR to TS 38.101-3: to add missing requirements for inter-band CA between FR1 and FR2. Samsung</p> <p>R4-1812360 Draft CR to 38.101-3: Corrcetion to UL configuration for EN-DC reference sensitivity exceptions Skyworks Solutions Inc.</p> <p>R4-1812361 Draft CR to 38.101-3: NR uplink DFT-S-OFDM waveforms for EN-DC reference sensitivity Skyworks Solutions Inc.</p> <p>R4-1812362 Draft CR to 38.101-3: Editorial and RB allocation corrections to table 7.3B.2.3.4-2 Skyworks Solutions Inc.</p> <p>R4-1812363 Draft CR to 38.101-3: Single UL allowed operation corrections in clause 7.3B.2.3.5 Skyworks Solutions Inc.</p> <p>R4-1812404 Non-contiguous intra-band EN-DC emission requirements Qualcomm Incorporated</p> <p>R4-1812410 Correction on REFSENS exception for EN-DC 41A-n77A/n78A SoftBank Corp.</p> <p>R4-1812670 Correction on REFSENS exceptions of DC_5A-7A_n78A to TS 38.101-3 LG Uplus</p> <p>R4-1813471 draft CR on applicability of TDD configuratiin for CA in TS 38.101-3 Huawei</p> <p>R4-1813796 Draft CR for 38.101-3: Intra-band Pcmx for Type 2 UEs Sprint Corporation</p> <p>R4-1813816 Renaming of DC_(n)71B into DC_(n)71AA Nokia</p> <p>R4-1813817 Corrcetion to EN-DC operating bands and configurations Nokia</p> <p>R4-1813818 Draft CR on correction REFSENS exceptions due to dual uplink operation for inter-band EN-DC to TS 38.101-3 Samsung</p> <p>R4-1813822 Draft CR for 38.101-3: Single UL allowed criteria in Annex I Vodafone España SA</p> <p>R4-1814157 Draft CR for UE-to-UE coexistence requirements for intra-band EN-DC in TS38.101-3 LG Electronics France</p> | 15.4.0 |

|         |        |           |      |   |   |   |        |
|---------|--------|-----------|------|---|---|---|--------|
|         |        |           |      |   |   | <p>R4-1814167 Draft CR on Single UL for some EN-DC combinations Huawei</p> <p>Endorsed draft CRs from Ran4#89:</p> <p>R4-1815952 dCR on TS38.101-3 merging draft CRs from RAN4#(88Bis) Qualcomm Incorporated</p> <p>R4-1814803 Draft CR on editorial error for EN-DC band combinations to TS 38.101-3 Huawei, HiSilicon</p> <p>R4-1815802 draft CR editorial correction in 38.101-3 Ericsson</p> <p>R4-1814425 Simplification of requirements for EN-DC configuration including FR2 NTT DOCOMO, INC.</p> <p>R4-1814512 Draft CR to TS38.101-3_Corrections on MSD requirements for EN-DC combinations of band 8 and n77 n78(Section 7.3B.2.3.1) ZTE Corporation</p> <p>R4-1814938 Draft CR to 38.101-3 on operating bands for CA and DC ZTE Corporation Zhifeng Ma</p> <p>R4-1814976 Correction for Maximum output power for inter-band EN-DC (two bands) Nokia, Nokia Shanghai Bell</p> <p>R4-1814977 Correction for ?TIB,c for EN-DC Nokia, Nokia Shanghai Bell</p> <p>R4-1814978 MPR and A-MPR for interband EN-DC Nokia, Nokia Shanghai Bell</p> <p>R4-1814980 Correction for intra-band EN-DC bandwidth class Nokia, Nokia Shanghai Bell</p> <p>R4-1815065 draft CR for adding missing transmit signal quality for inter band EN-DC for TS 38.101-3 NTT DOCOMO, INC.</p> <p>R4-1815811 draft Rel-15 CR to 38.101-3 to correct n260 BW class Ericsson, AT&amp;T</p> <p>R4-1815865 Draft CR for 38.101-3 Intra-band EN-DC nominal carrier spacing for 30 kHz raster SPRINT Corporation</p> <p>R4-1815973 Draft CR to 38.101-3 rel. 15 to fix MSD issues for higher order EN-DC combinations</p> <p>R4-1816227 Draft CR on Power Class for inter band EN-DC within FR1 OPPO</p> <p>R4-1816233 Receiver requirements for intra-band EN-DC Qualcomm Incorporated</p> <p>R4-1816621 Introduction of maxUplinkDutyCycle to ENDC HPUE in FR1 OPPO</p> <p>R4-1816638 Pcmx computation and evaluation for inter band ENDC Qualcomm</p> <p>R4-1816178 Draft CR for correction for missing agreed DC combinations in Rel-15 for TS 38.101-3 NTT DOCOMO, INC.</p> <p>R4-1816197 Draft CR to TS38.101-3_Clarifications on MSD and UL configuration tables for EN-DC ZTE Corporation</p> <p>R4-1816198 Simplification of EN-DC and CA between FR1 and FR2 UE to UE co-ex table by adopting CA band approach Nokia, Nokia Shanghai Bell</p> <p>R4-1816202 Correction to interband EN-DC OOB emission requirements Nokia, Nokia Shanghai Bell</p> <p>R4-1816203 Receiver requirements for interband EN-DC Nokia, Nokia Shanghai Bell</p> <p>R4-1816207 Draft CR to 38.101-3 rel. 15 to fix MPR issue Apple GmbH</p> <p>R4-1816224 Draft CR for 38.101-3 NS_04 applicability for intra-band EN-DC SPRINT Corporation</p> <p>R4-1816231 Draft CR on output power dynamic for DC OPPO</p> <p>R4-1816237 Correction for Intra-band contiguous EN-DC A-MPR definition Nokia, Nokia Shanghai Bell</p> <p>R4-1816246 Draft CR to TS38.101-3: Corrections on TS for MSD calculations based on ENDC bands combination including of bands 1,3,8, n77, and n78 MediaTek Inc.</p> <p>R4-1816247 Draft CR 38-101-3 Corrections for EN-DC Single Uplink allowed Operation Skyworks Solutions Inc.</p> <p>R4-1816250 draft CR for adding note about the fallback of EN-DC in Applicability of minimum requirements for TS 38.101-3 NTT DOCOMO, INC.</p> <p>R4-1816608 Draft CR on LTE RMC for TDD EN-DC UE RF Tests Qualcomm Incorporated</p> <p>R4-1816613 Draft CR for reducing AMPR for DC_(n)71AA without Dynamic Power Sharing" Motorola Mobility, T-Mobile"</p> |        |
| 2018-12 | RAN#82 | RP-182773 | 0033 | 1 | F | Completion of configured maximum output power for intra-band contiguous EN-DC   | 15.4.0 |
| 2018-12 | RAN#82 | RP-182774 | 0034 | 1 | F | Configured maximum output power for intra-band non-contiguous EN-DC   | 15.4.0 |

|         |        |           |      |  |   |  |        |
|---------|--------|-----------|------|--|---|--|--------|
| 2019-03 | RAN#83 | RP-190403 | 0035 |  | F | <p>CR to TS 38.101-3: Implementation of endorsed draft CRs from RAN4#90</p> <p>Endorced draft CRs from RAN4#90<br/> R4-1900034, Editorial corrections for 38.101-3, Qualcomm Incorporated<br/> R4-1900460, Draft CR to TS38.101-3_corrections on MSD, ZTE Corporation<br/> R4-1900461, Draft CR to TS38.101-3_inter-band NR DC between FR1 and FR2, ZTE Corporation<br/> R4-1900524, Draft CR to TS 38.101-3 on inter-band CA &amp; inter-band EN-DC configurations, ZTE Corporation<br/> R4-1900529, Draft CR to TS 38.101-3 on Single Uplink Allowed for EN-DC combinations of order 3 or higher, ZTE Corporation<br/> R4-1900726, Editorial corrections to delta Tib for EN-DC, Rohde &amp; Schwarz<br/> R4-1901359, draft CR for correction for missing operating band for EN-DC, NTT DOCOMO INC.<br/> R4-1901428, draft CR to make editorial corrections in 38-101-3 Rel-15, Ericsson<br/> R4-1901848, Draft CR for 38.101-3: Addition of default power class, Sprint Corporation<br/> R4-1901850, Draft CR for 38.101-3: Intra-band P<sub>cmx</sub> P<sub>EN-DC</sub> Total for non-DPS UEs, Sprint Corporation<br/> R4-1901851, Draft CR for 38.101-3: Intra-band P<sub>cmx</sub> Editorial corrections, Sprint Corporation<br/> R4-1901874, Guardband for harmonic exception to reference sensitivity, Qualcomm Incorporated<br/> R4-1901878, Non-simultaneous Tx/Rx for TDD intra-band EN-DC, Qualcomm Incorporated<br/> R4-1901890, A-MPR for DC<sub>(n)</sub>71AA without Dynamic Power Sharing, Motorola Mobility France S.A.S<br/> R4-1901926, Draft CR to 38.101-3 to clarify ACS2 wanted level, Qualcomm Incorporated<br/> R4-1901997, draft_CR TS 38.101-3 type 2 UE DC<sub>(n)</sub>41 and DC<sub>41_n41</sub> NS04 AMPR correction, Skyworks Solutions Inc.<br/> R4-1902002, Draft CR to 38.101-3 on DC<sub>n41-41</sub> – B40 coexistence, Qualcomm Incorporated<br/> R4-1902154, Draft CR to TS38.101-3_clean up on inter-band CA between FR1 and FR2, ZTE Corporation<br/> R4-1902155, Draft CR for TS 38.101-3: Corrections to Table 7.3B.2.3.5.1-1 for reference sensitivity exceptions (two bands), MediaTek Inc.<br/> R4-1902156, draftCR corrections for TS 38.101-3, Huawei<br/> R4-1902157, CR on intraband ENDC channel configurations, Intel Corporation<br/> R4-1902160, Draft CR on some errors to TS 38.101-3, Huawei<br/> R4-1902161, CR to 38.101-3 to clarify non-simultaneous RXTX capability for co-bands, Qualcomm Incorporated<br/> R4-1902163, Draft CR to 38.101-3 to clarify DL carrier levels for bands in close frequency proximity, Qualcomm Incorporated<br/> R4-1902164, Draft CR to reflect agreed MSD analysis of DC<sub>25A-n41A</sub> for TS 38.101-3, MediaTek Inc.<br/> R4-1902169, draft CR for inter-band EN-DC P<sub>cmx</sub>, Huawei<br/> R4-1902172, Draft CR ACLR for NC intra-band EN-DC, Skyworks Solutions Inc.<br/> R4-1902176, Draft CR for 38.101-3 modification of requirements for intra-band non-contiguous EN-DC SEM, Huawei<br/> R4-1902179, draft CR for introduction of Tx IM for Inter-band EN-DC in TS38.101-3, NTT DOCOMO, INC.<br/> R4-1902182, Clarification for OOB boundary for intra-band contiguous and non-contiguous EN-DC, vivo<br/> R4-1902195, draft_CR TS 38.101-3 Footnote correction in Table 7.3B.2.3.1-2, Skyworks Solutions Inc.<br/> R4-1902232, Draft CR on SUL band combinations to TS 38.101-3, Huawei<br/> R4-1902478, Addition of power class 2 EN-DC ACLR requirement, Nokia<br/> R4-1902481, draftCR on inter-band EN-DC Rx requirement for TS 38.101-3, Huawei<br/> R4-1902486, Draft CR for 38.101-3 modification of requirements for network signalled value NS<sub>04</sub>, Huawei<br/> R4-1902496, Draft CR for TS 38.101-3: Switching time for intra-band EN-DC upon dual PA UE capability, Huawei<br/> R4-1902500, Draft CR for 38.101-3: adding MPR for intra-band ENDC, Skyworks Solutions Inc<br/> R4-1902660, Introduction of modified MPR for 38.101-3, Nokia</p> | 15.5.0 |
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|         |        |           |      |   | Editorial changes after RAN#83<br>To align the annex numbering with other specifications (TS 38.101-x series), 'Modified MPR behavior' was moved to annex H.   |        |
| 2019-06 | RAN#84 | RP-191240 | 0041 | F | <p>CR to TS 38.101-3: Implementation of endorsed draft CRs from RAN4#90bis and RAN4#91</p> <p>Endorced draft CRs from RAN4#90Bis<br/>                     R4-1902829, Draft CR for 38.101-3 editorial correction for editorial correction for intra-band contiguous EN-DC uplink configuration when Rx requirements are measured, Huawei<br/>                     R4-1903074 Draft CR to 38.101-3 rel. 15 to fix missing SUO note Apple Inc.<br/>                     R4-1903090 Pcm<sub>ax</sub> for Rel-15 intra-band EN-DC within FR1 wrong references - fixes InterDigital Communications<br/>                     R4-1903150 Draft CR to TS 38.101-3_Spurious emission and Tx IM for inter-band CA between FR1 and FR2 ZTE Corporation<br/>                     R4-1903302 Draft CR to TS 38.101-3 correction for the DC_3_n3 delta R IBNC table CHTTL<br/>                     R4-1903426 draft CR for 38.101-3: Reflect the agreed MSD for DC_5_n78 China Telecom<br/>                     R4-1903515 Removal of reference sensitivity exception due to close proximity of bands for EN-DC in NR FR1 clause Nokia<br/>                     R4-1903958 Completion of defintions of EN-DC configured power Ericsson<br/>                     R4-1904639 Draft CR to 38.101-3 on DC_n41-41 – B40 coexistence, Qualcomm Incorporated<br/>                     R4-1904934 Harmonization of reference sensitivity level for DC clause Nokia<br/>                     R4-1904935 Change description 4.2(e) in Applicability of minimum requirements for TS 38.101-3 vivo<br/>                     R4-1904945 Draft CR to TS38.101-3_adding some exclusion frequencies for SEM and spurious emission for EN-DC ZTE Corporation<br/>                     R4-1904946 Draft CR to TS 38.101-3 on some minor corrections ZTE Corporation<br/>                     R4-1904951 Draft CR for 38.101-3 intra-band EN-DC AMPR Huawei<br/>                     R4-1904953 Draft CR for 38.101-3: NS_04 A-MPR power class relationship clarification Sprint Corporation<br/>                     R4-1904959 Draft CR on UE to UE coexistence for TS 38.101-3 Huawei<br/>                     R4-1904988 Draft CR to 38.101-1. Clarify EN-DC category for requirements of carrier imbalance Qualcomm Incorporated<br/>                     R4-1904995 draft CR to 38.101-3 Configured output power for inter-band EN-DC including both FR1 and FR2 Intel Corporation<br/>                     R4-1905085 Draft CR for TR 38.101-3 NE-DC RF requirement Huawei<br/>                     R4-1904925 Draft CR for improving EN-DC configuration tables in TS38.101-3 CATT</p> <p>Endorced draft CRs from RAN4#91<br/>                     R4-1905628 Draft CR to TS38.101-3_Frequency error for intra-band for EN-DC ZTE Corporation<br/>                     R4-1905629 Draft CR to TS 38.101-3_removal of the reference sensitivity exception for NR CA between FR1 and FR2 ZTE Corporation<br/>                     R4-1905767 draft CR to 38.101-3 Correction ot DeltaTIB,c in configured output power for EN-DC Intel Corporation<br/>                     R4-1905774 Draft CR to TS38.101-3 Correction to intra-band and inter-band EN-DC Pcm<sub>ax</sub> Intel Corporation<br/>                     R4-1905793 CR for TS 38.101-3 (Rel-15): Support of n257D-F for DC_1-42_n257 and DC_3-42_n257 SoftBank Corp.<br/>                     R4-1905799 Correction of LTE anchor condition to Spurious response for EN-DC Anritsu Corporation<br/>                     R4-1907057 Draft CR for 38.101-3: Further UE coexistence table clean-up Sprint Corporation<br/>                     R4-1907063 Draft CR for 38.101-3: Global replacement of LTE with E-UTRA Sprint Corporation<br/>                     R4-1907136 Draft CR to 38.101-3 rel. 15 to fix missing Exceptions for Out-of-band Blocking Apple<br/>                     R4-1907137 Draft CR to 38.101-3 rel. 15 to fix missing SUO note Apple<br/>                     R4-1907181 Draft CR for 38.101-3: Removal of unnecessary ACLR notes Sprint Corporation<br/>                     R4-1907422 Draft CR for TS 38.101-1 Correction of channel bandwidth set for NR CA Huawei</p> | 15.6.0 |

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|         |        |           |      |   | <p>R4-1907424 Draft CR for clarification of note for B42_n77 and B42_n78 NTT DOCOMO, INC.</p> <p>R4-1907425 DraftCR TS 38.101-3 Corrections to Intra-band ENDC MPR text Skyworks Solutions Inc.</p> <p>R4-1907426 Definition of BCS support in inter-band EN-DC mode Qualcomm Incorporated</p> <p>R4-1907448 Correction to EN-DC spurious emissions ROHDE &amp; SCHWARZ</p> <p>R4-1907476 draft CR for TS 38.101-3 intra-band EN-DC Pcmaw Huawei</p> <p>R4-1907482 Correction of RefSens exceptions due to UL harmonic interference for EN-DC in 38.101-3 vivo</p> <p>R4-1907483 [Rx]Draft CR for 38.101-3 defining Reference sensitivity for intra-band non-contiguous, Huawei</p> <p>R4-1907485 Corrections to MPR/A-MPR and additional requirements for intra-band EN-DC Ericsson</p> <p>R4-1907489 Draft CR to 38.101-3. Revise MSD for DC_20A-n8A Qualcomm Incorporated</p> <p>R4-1907492 Modification of reference sensitivity and general spurious emissions in 38.101-3 Qualcomm Incorporated</p> <p>R4-1907594 draft CR of modification on reference for inter-band EN-DC including FR2 for TS 38.101-3 NTT DOCOMO INC.</p> <p>R4-1907808 Draft CR to 38.101-3 NE-DC introduction InterDigital Communications</p>  |        |
| 2019-12 | RAN#86 | RP-192049 | 0063 | F | <p>CR to TS 38.101-3: Implementation of endorsed draft CRs from RAN4#92 (Rel-15)</p> <p>R4-1907957 Reference sensitivity for intra-band EN-DC with single uplink Qualcomm Incorporated</p> <p>R4-1908028 Draft CR for handling of fallbacks for combined contiguous and non-contiguous CA in FR2</p> <p>R4-1908162 dCR to 38.101-3: EN-DC REFSENS editorial updates Qualcomm Incorporated</p> <p>R4-1908376 Draft CR for TS38.101-3, Editorial corrections CATT</p> <p>R4-1908434 Further correction of RefSens exceptions due to UL harmonic interference for EN-DC in 38.101-3 vivo</p> <p>R4-1908692 Editorial correction on SUO mark for BC 3+78 Apple Inc.</p> <p>R4-1908959 Draft CR for 38.101-3 adding note for spurious emission band UE co-existence Huawei, HiSilicon</p> <p>R4-1908960 Draft CR for 38.101-3 clean up for inter-band NE-DC Huawei, HiSilicon</p> <p>R4-1909065 Draft CR for editorial correction on EN-DC of 4LTE bands + 1NR band for Rel-15 TS 38.101-3 NTT DOCOMO, INC.</p> <p>R4-1909354 Draft CR to TS 38.101-3 on UE additional maximum output power reduction for EN-DC ZTE Corporation</p> <p>R4-1909357 Draft CR to TS 38.101-3 on UE maximum output power for DC ZTE Corporation</p> <p>R4-1909798 Correction of DC configurations in tables chapter 5 Ericsson</p> <p>R4-1909903 Draft CR for 38.101-3: Correction of Note 2 in Table 5.5B.2-1 Sprint, Ericsson, Google</p> <p>R4-1909956 dCR to 38.101-3 EN-DC RX Out-of-Band Blocking for Inter-bands treated as Intra-band Qualcomm Inc.</p> <p>R4-1909977 draftCR to 38.101-3 for missing Harmonic Mixing MSD fo DC_11A_n79A like DC 21A n79A Qualcomm Inc.</p> <p>R4-1910236 Draft CR of modification on reference to 38.101-2 requirements for inter-band EN-DC with FR2 for TS 38.101-3 NTT DOCOMO, INC.</p> <p>R4-1910245 draft CR to correct band of band26 related EN-DC KDDI</p> <p>R4-1910246 Draft CR to add simultaneous RX/TX capability requirements in R15 TS 38.101-3 CMCC</p> <p>R4-1910248 Draft CR to TS 38.101-3 for DC_38_n78 mandatory simultaneous Rx/Tx capability Vodafone</p> <p>R4-1910249 Draft CR for handling of EN-DC BCS for TS 38.101-3 NTT DOCOMO, INC.</p> <p>R4-1910250 draftCR to 38.101-3 for missing IMD MSD for shared bands that already have MSD Qualcomm Inc.</p> <p>R4-1910251 Draft CR for 38.101-3: non-contiguous resource allocation Huawei, HiSilicon</p> <p>R4-1910255 Draft Minor Corrections to 38.101-3 clause 6.2B.4.1.1 Motorola Mobility, T-Mobile USA</p> <p>R4-1910256 draft CR for 38.101-3 specifying occupied bandwidth for intra-band non-contiguous EN-DC Huawei, HiSilicon</p> | 15.7.0 |

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|         |        |           |      |   |   | R4-1910257 Draft CR to TS 38.101-3: transmit intermodulation for intra-band EN-DC ZTE Corporation<br>R4-1910268 Draft CR for TS 38.101-3: Corrections to reference sensitivity exceptions due to receiver harmonic mixing and cross band isolation for EN-DC in NR FR1 MediaTek Inc.<br>R4-1910317 Draft CR for TS 38.101-3: Additional out-of-band blocking exceptions for inter-band EN-DC MediaTek Inc.<br>R4-1910318 Draft CR for 38.101-3: EN-DC Pcmaw Huawei, HiSilicon<br>R4-1909111 Draft CR for 38.101-3 applicability for intra-band CA and ENDC Huawei, HiSilicon |         |
| 2019-12 | RAN#86 | RP-193032 | 0074 |   | F | CR for 38.101-3 EN-DC RX Out-of-Band Blocking for shared bands and bands in close proximity  | 15.8.0  |
| 2019-12 | RAN#86 | RP-193032 | 0076 |   | F | CR to 38.101-3 Missing Harmonic Mixing MSD for DC_3_n77/n78  | 15.8.0  |
| 2019-12 | RAN#86 | RP-193032 | 0078 |   | F | CR for 38.101-3 EN-DC DL Synchronous Carriers  | 15.8.0  |
| 2019-12 | RAN#86 | RP-193032 | 0084 |   | F | CR for 38.101-3: Correction to DC Config and dual UL interferer (Rel-15)   | 15.8.0  |
| 2019-12 | RAN#86 | RP-193032 | 0086 |   | F | CR for 38.101-3: Correction to EN-DC and NE-DC Configurations (Rel-15)   | 15.8.0  |
| 2019-12 | RAN#86 | RP-193033 | 0088 | 1 | F | CR to 38.101-3: clarification of ENDC power class in R15   | 15.8.0  |
| 2019-12 | RAN#86 | RP-193032 | 0089 | 1 | F | CR to TS38.101-3: Correction on channel spacing for intra-band EN-DC carriers (section 5.4B.1)   | 15.8.0  |
| 2019-12 | RAN#86 | RP-193032 | 0098 |   | F | CR to TS 38.101-3 on inter-band EN-DC configurations including FR2 for five bands (Rel-15)   | 15.8.0  |
| 2019-12 | RAN#86 | RP-193032 | 0103 |   | F | CR to TS 38.101-3 on inter-band CA, EN-DC, NE-DC and NR-DC configurations (Rel-15)   | 15.8.0  |
| 2019-12 | RAN#86 | RP-193032 | 0104 |   | F | CR to TS 38.101-3: clarification for MPR statement   | 15.8.0  |
| 2019-12 | RAN#86 | RP-193032 | 0105 |   | F | CR for TS 38.101-3: Removing MSD requirements for EN-DC combinations due to receiver even order harmonic mixing with UL 3rd harmonic   | 15.8.0  |
| 2019-12 | RAN#86 | RP-193033 | 0110 |   | F | CR to TS 38.101-3: adding missing 90MHz channel BW support for n77, n78 related CA   | 15.8.0  |
| 2019-12 | RAN#86 | RP-193033 | 0113 |   | F | Removal of brackets from MPR and MSD 38.101-3 REL15  | 15.8.0  |
| 2019-12 | RAN#86 | RP-193033 | 0119 |   | F | Pcmaw for EN-DC: applicability of NS values and removal of a duty-cycle capability   | 15.8.0  |
| 2019-12 | RAN#86 | RP-193033 | 0124 |   | B | CR for TS 38.101-3: Additional out-of-band blocking exceptions for inter-band EN-DC  | 15.8.0  |
| 2019-12 | RAN#86 | RP-193033 | 0127 |   | F | CR for 38.101-3: correct MSD exception for DC_2_n78(Rel-15)  | 15.8.0  |
| 2019-12 | RAN#86 | RP-193033 | 0135 | 1 | F | CR for 38.101-3: Clarification of the notation for intra-band EN-DC combinations   | 15.8.0  |
| 2019-12 | RAN#86 | RP-193033 | 0137 |   | F | CR to 38.101-3-f70 Corrections to MSD Due to Cross-band Isolation for EN-DC in FR1   | 15.8.0  |
| 2019-12 | RAN#86 | RP-193033 | 0141 |   | F | CR to 38.101-3 on only synchronous NR-DC between FR1 and FR2 support in Rel-15   | 15.8.0  |
| 2019-12 | RAN#86 | RP-193033 | 0142 | 2 | F | CR for 38.101-3 Correction of EN-DC BCS  | 15.8.0  |
| 2019-12 | RAN#86 | RP-193033 | 0144 |   | F | CR for 38.101-3 correction for intra-band EN-DC Pcmaw  | 15.8.0  |
| 2019-12 | RAN#86 | RP-193033 | 0145 |   | F | CR for 38.101-3 intra-band EN-DC MPR/AMPR  | 15.8.0  |
| 2020-03 | RAN#87 | RP-200396 | 0163 |   | F | CR for 38.101-3: Correction of MOP tolerance for B41/n41 EN-DC   | 15.9.0  |
| 2020-03 | RAN#87 | RP-200396 | 0171 |   | F | CR to TS 38.101-3: corrections on ACS for intra-band contiguous EN-DC  | 15.9.0  |
| 2020-03 | RAN#87 | RP-200396 | 0173 | 1 | D | CR to TS 38.101-3: editorial corrections on Rx requirements for intra-band contiguous EN-DC  | 15.9.0  |
| 2020-03 | RAN#87 | RP-200396 | 0176 | 1 | F | CR to TS 38.101-3: Correct the intra-band ENDC channel spacing   | 15.9.0  |
| 2020-03 | RAN#87 | RP-200396 | 0192 |   | F | CR to TS 38.101-3: editorial correction for output power dynamics for intra-band EN-DC   | 15.9.0  |
| 2020-03 | RAN#87 | RP-200396 | 0198 |   | F | CR on correction of 38.101-3 NEDC Ppowerclass (Rel-15)   | 15.9.0  |
| 2020-03 | RAN#87 | RP-200396 | 0209 | 1 | F | Rel-15 CR to 38.101-3 for editorial corrections  | 15.9.0  |
| 2020-03 | RAN#87 | RP-200396 | 0210 |   | F | CR to 38.101-3 R15 to remove FDM ULSUP combinations  | 15.9.0  |
| 2020-03 | RAN#87 | RP-200396 | 0212 |   | F | CR for inter-band ENDC Tx requirement_Rel-15   | 15.9.0  |
| 2020-03 | RAN#87 | RP-200396 | 0216 | 1 | F | EN-DC configuration table corrections  | 15.9.0  |
| 2020-06 | RAN#88 | RP-200985 | 0239 |   | F | CR for TS 38.101-3: MSD due to UL harmonic   | 15.10.0 |
| 2020-06 | RAN#88 | RP-200985 | 0244 |   | F | MOP for interband EN-DC including both FR1 and FR2 REL15   | 15.10.0 |
| 2020-06 | RAN#88 | RP-200985 | 0258 |   | F | CR to TS 38.101-3 on configured output power relaxation due to EN-DC (Rel-15)  | 15.10.0 |
| 2020-06 | RAN#88 | RP-200985 | 0260 |   | F | CR to TS 38.101-3 on REFSSENS relaxation due to EN-DC (Rel-15)   | 15.10.0 |
| 2020-06 | RAN#88 | RP-200985 | 0250 | 1 | F | CR for 38.101-3: Corrections for Ppowerclass and referenced sections   | 15.10.0 |
| 2020-06 | RAN#88 | RP-200985 | 0266 | 1 | F | CR to TS 38.101-3: Clean up the MSD test point for ENDC(three band)  | 15.10.0 |
| 2020-06 | RAN#88 | RP-200985 | 0231 | 1 | F | CR Coexistence cleanup for 38101-3 Rel15   | 15.10.0 |
| 2020-06 | RAN#88 | RP-200985 | 0237 | 1 | F | CR for TS 38.101-3: Missing MSD due to cross band isolation  | 15.10.0 |
| 2020-06 | RAN#88 | RP-200985 | 0242 | 1 | F | FR1+FR2 CA interband CA BCS support REL15  | 15.10.0 |



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| 2020-06 | RAN#88   | RP-200985 | 0247 | 1 | B | CR to 38.101-3 MSD due to UL harmonics and intermodulation interference   | 15.10.0 |
| 2020-06 | RAN#88   | RP-200985 | 0233 | 1 | F | CR to TS 38.101-3 R15: corrections on ACS for intra-band contiguous EN-DC   | 15.10.0 |
| 2020-06 | RAN#88   | RP-200985 | 0235 | 1 | F | CR to TS 38.101-3: editorial corrections on wide band Intermodulation for intra-band contiguous EN-DC in FR1  | 15.10.0 |
| 2020-06 | RAN#88   | RP-200988 | 0295 |   | F | CR to remove TBD in 38.101-3  | 15.10.0 |
| 2020-06 | RAN#88   | RP-200985 | 0271 | 2 | F | Removal of the Annex modified MPR-Behaviour from the NSA specification  | 15.10.0 |
| 2020-06 | RAN#88   | RP-200985 | 0239 |   | F | CR for TS 38.101-3: MSD due to UL harmonic  | 15.10.0 |
| 2020-09 | RAN#89   | RP-201512 | 0306 | 1 | F | CR for missing IMD MSD in 38.101-3 for DC_1A-41A_n78A, DC_7A-28A_n78A   | 15.11.0 |
| 2020-09 | RAN#89   | RP-201512 | 0308 |   | F | Correction to in-band emissions for intra-band contiguous EN-DC   | 15.11.0 |
| 2020-09 | RAN#89   | RP-201512 | 0316 | 2 | F | CR to 38.101-3 MSD due to UL harmonics and intermodulation interference   | 15.11.0 |
| 2020-09 | RAN#89   | RP-201512 | 0318 |   | F | CR to correct protected band of intra-band EN-DC  | 15.11.0 |
| 2020-09 | RAN#89   | RP-201512 | 0322 | 1 | F | CR for TS 38.101-3: FR1 inter-band EN-DC out-of-band blocking UL configuration  | 15.11.0 |
| 2020-09 | RAN#89   | RP-201512 | 0325 | 1 | F | Corrections of Japan-related EN-DC co-ex tables for REL-15 combo  | 15.11.0 |
| 2020-12 | RAN#90   | RP-202485 | 0369 |   | F | UL output power for spurious response and general Rx  | 15.12.0 |
| 2020-12 | RAN#90   | RP-202485 | 0384 | 1 | F | CR to TS 38.101-3: Some corrections on the ENDC   | 15.12.0 |
| 2020-12 | RAN#90   | RP-202485 | 0397 |   | F | CR to correct MSD of DC_1A-41A_n77A   | 15.12.0 |
| 2020-12 | RAN#90   | RP-202485 | 0399 |   | F | Correction of CR0325 implementation   | 15.12.0 |
| 2020-12 | RAN#90   | RP-202485 | 0409 | 1 | F | Correction of applicability of 2Rx requirements   | 15.12.0 |
| 2020-12 | RAN#90   | RP-202485 | 0411 | 1 | F | CR 38101-3 R15 Band 10 protection and DC_42_n79 correction  | 15.12.0 |
| 2020-12 | RAN#90   | RP-202485 | 0419 | 1 | F | CR for 38.101-3 Correction on EN-DC synchronous carriers (R15)  | 15.12.0 |
| 2020-12 | RAN#90   | RP-202485 | 0423 | 1 | F | CR for TS 38.101-3: correction of spurious emission band UE co-existence (R15)  | 15.12.0 |
| 2021-03 | RAN#91   | RP-210117 | 0474 | 1 | F | CR for 38.101-3 to introduce a new MSD due to the counter intermodulation interference(Rel-15)  | 15.13.0 |
| 2021-03 | RAN#91   | RP-210117 | 0502 |   | F | CR for 38.101-3: clarification of intra-band EN-DC BCS applicability  | 15.13.0 |
| 2021-03 | RAN#91   | RP-210851 | 0508 | 1 | F | Correcting FR1-FR2 BCS ambiguity – Interpretation B   | 15.13.0 |
| 2021-06 | RAN#92-e | RP-211080 | 0514 | 1 | F | CR for clarification on interBandContiguousMRDC in TS 38.101-3  | 15.14.0 |
| 2021-06 | RAN#92-e | RP-211080 | 0517 | 1 | F | Corrections to EN-DC spurious emission tables   | 15.14.0 |
| 2021-06 | RAN#92-e | RP-211086 | 0530 | - | F | CR to TS 38.101-3[R15]: Addition of UE co-existence requirements for band 40 and n40.   | 15.14.0 |
| 2021-06 | RAN#92-e | RP-211080 | 0534 | 1 | F | Cleanup for UE co-existence 38.101-3 Rel-15   | 15.14.0 |
| 2021-06 | RAN#92-e | RP-211088 | 0572 |   | F | CR to TS38.101-3: Correction on TIB,c description for FR1-FR2 CA  | 15.14.0 |
| 2021-09 | RAN#93-e | RP-211921 | 0430 | 3 | F | CR to 38.101-3 on handling of fallbacks for FR2 CA  | 15.15.0 |
| 2021-09 | RAN#93-e | RP-211923 | 0636 |   | F | Big CR for TS 38.101-3 Maintenance part1 (Rel-15)   | 15.15.0 |
| 2021-12 | RAN#94-e | RP-212854 | 0669 |   | F | Big CR for TS 38.101-3 Maintenance (Rel-15)   | 15.16.0 |
| 2022-03 | RAN#95   | RP-220337 | 0700 |   | F | Big CR for TS 38.101-3 Maintenance (Rel-15)   | 15.17.0 |
| 2022-06 | RAN#96   | RP-221655 | 0733 |   | F | Big CR for TS 38.101-3 Maintenance (Rel-15)   | 15.18.0 |
| 2022-09 | RAN#97   | RP-222023 | 0750 |   | F | Big CR for 38.101-3 maintenance (Rel-15)  | 15.19.0 |
| 2022-10 | RAN#97   |           |      |   |   | Editorial change  | 15.19.1 |
| 2022-12 | RAN#98-e | RP-223291 | 0764 | 1 | F | CR for TS 38.101-3 on clarifications for intra-band EN-DC configurations  | 15.20.0 |
| 2022-12 | RAN#98-e | RP-223290 | 0788 |   | F | CR to TS38.101-3[R15] 4Rx MSD for ENDC  | 15.20.0 |
| 2022-12 | RAN#98-e | RP-223290 | 0797 |   | F | R15 CR on inter band ENDC OOB correction  | 15.20.0 |
| 2022-12 | RAN#98-e | RP-223291 | 0802 | 1 | F | CR on TDD RMC for Intra-band EN-DC - TS 38.101-3  | 15.20.0 |
| 2023-03 | RAN#99   | RP-230502 | 0828 |   |   | CR on Harmonic mixing MSD for DC_8A-n79A (R15)  | 15.21.0 |
| 2023-03 | RAN#99   | RP-230502 | 0839 |   | F | CR to R15 TS38.101-3 maintenance for UE co-ex requirements for UL EN-DC   | 15.21.0 |
| 2023-03 | RAN#99   | RP-230503 | 0870 |   | F | CR for TS 38.101-3 to introduce DC_20_n28 general description   | 15.21.0 |
| 2023-03 | RAN#99   | RP-230503 | 0887 |   | F | CR for TS 38.101-3 on intra-band EN-DC band combination support for DC_(n)41  | 15.21.0 |
| 2023-06 | RAN#100  |           | 0929 |   |   | UNDONE CHANGES (because of missing changes in Rel-16 CR#0930, it will be implemented in the next version) Rel15 Cat F CR for 38.101-3 Add R18,8R relaxation for ENDC with 8 Rx antennas ports for EUTRA bands | 15.22.0 |
| 2023-06 | RAN#100  | RP-231355 | 0936 |   | F | CR to TS38.101-3: Corrections on MOP FR1-FR2 inter-band NR CA and MOP/MPR for ENDC including FR2/FR1 and FR2  | 15.22.0 |
| 2023-06 | RAN#100  | RP-231356 | 0963 |   | F | CR to R15 TS38.101-3 for addition of missing MSD requirements for DC_19_n77 and DC_21_n77   | 15.22.0 |
| 2023-06 | RAN#100  | RP-231356 | 0969 |   | F | CR for corrections on EN-DC channel bandwidth section   | 15.22.0 |
| 2023-09 | RAN#101  | RP-232505 | 0993 |   | F | Rel15 Cat F CR for 38.101-3 Add ? RIB,8R relaxation for EN-DC combos with 8Rx antennas ports for EUTRA bands  | 15.23.0 |
| 2023-09 | RAN#101  | RP-232501 | 1004 |   | F | [NR_newRAT-Core] Corrections on the description on the delta Rib value for DCA and DC in REFSEN requirement   | 15.23.0 |

|         |         |           |      |  |   |   |         |
|---------|---------|-----------|------|--|---|---|---------|
| 2023-09 | RAN#101 | RP-232487 | 1013 |  | F | CR for Rel-15 38.101-3 clarification on non-simultaneous Rx/Tx operation for ENDC including CA_n77-n79 and CA_n78-n79 | 15.23.0 |
| 2023-12 | RAN#102 | RP-233331 | 1042 |  | F | [NR_newRAT-Core] Correction to 6.5B.3.3.2 (Rel-15)  | 15.24.0 |

## History

| <b>Document history</b> |                |             |
|-------------------------|----------------|-------------|
| V15.2.0                 | July 2018      | Publication |
| V15.3.0                 | October 2018   | Publication |
| V15.4.0                 | April 2019     | Publication |
| V15.5.0                 | May 2019       | Publication |
| V15.6.0                 | July 2019      | Publication |
| V15.7.0                 | October 2019   | Publication |
| V15.8.0                 | April 2020     | Publication |
| V15.9.0                 | April 2020     | Publication |
| V15.10.0                | July 2020      | Publication |
| V15.11.0                | November 2020  | Publication |
| V15.12.0                | January 2021   | Publication |
| V15.13.0                | April 2021     | Publication |
| V15.14.0                | September 2021 | Publication |
| V15.15.0                | October 2021   | Publication |
| V15.16.0                | March 2022     | Publication |
| V15.17.0                | May 2022       | Publication |
| V15.18.0                | July 2022      | Publication |
| V15.19.1                | January 2023   | Publication |
| V15.20.0                | January 2023   | Publication |
| V15.21.0                | May 2023       | Publication |
| V15.22.0                | August 2023    | Publication |
| V15.23.0                | October 2023   | Publication |
| V15.24.0                | February 2024  | Publication |