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TECHNICAL SPECIFICATION

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Part 3: Range 1 and Range 2 Interworking operation with other radios
(3GPP TS 38.521-3 version 15.2.0 Release 15)

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Contents

Foreword

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The present document is part 3 of a multi-part Technical Specification (TS) covering the New Radio (NR) User Equipment (UE) conformance specification, which is divided in the following parts:

FFS

1 Scope

The present document specifies the measurement procedures for the conformance test of the user equipment (UE) that contain RF characteristics for carrier aggregation between Range 1 and Range 2 and additional requirements due to NR non-standalone (NSA) operation mode with E-UTRA.

The requirements are listed in different clauses only if the corresponding parameters deviate. More generally, tests are only applicable to those mobiles that are intended to support the appropriate functionality. To indicate the circumstances in which tests apply, this is noted in the "*definition and applicability*" part of the test.

For example only Release 15 and later UE declared to support 5G-NR shall be tested for this functionality. In the event that for some tests different conditions apply for different releases, this is indicated within the text of the test itself.

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.
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- 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*.

Editor's note: intended to capture more references

[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 38.101-3: "NR; User Equipment (UE) radio transmission and reception; Part 3: Range 1 and Range 2 Interworking operation with other radios"

[5] 3GPP TS 36.101: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception"

[6] 3GPP TS 38.508-1: "5GS; User Equipment (UE) conformance specification; Part 1: Common test environment"

[7] 3GPP TR 38.905: "NR; Derivation of test points for radio transmission and reception conformance test cases"

[8] 3GPP TS 38.521-1:" User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: Range 1 Standalone

[9] 3GPP TS 38.521-2:" NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 2: Range 2 Standalone"

[10] 3GPP TS 36.521-1:" Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: Conformance testing"

[11] 3GPP TS 36.508:" Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Packet Core (EPC); Common test environments for User Equipment (UE) conformance testing"

[12] 3GPP TS 36.133:" Evolved Universal Terrestrial Radio Access (E-UTRA); Requirements for support of radio resource management"

[13] 3GPP TS 36.211: "E-UTRA; Physical channels and modulation"

[14] 3GPP TS 38.522: "NR; User Equipment (UE) conformance specification; Applicability of radio transmission, radio reception and radio resource management test cases"

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 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 TR 21.905 [1].

Editor's note: intended to capture definitions

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*
$BW_{LTE\_Channel}$	Channel bandwidth of E-UTRA carrier
$BW_{LTE\_Channel\_CA}$	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
$EN\text{-}DC_{ACLR}$	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
$E\text{-}UTRA_{ACLR}$	E-UTRA ACLR
F_C	*RF reference frequency* for the carrier centre on the channel raster
F_{DL_low}	The lowest frequency of the downlink *operating band*
F_{DL_high}	The highest frequency of the downlink *operating band*
F_{UL_low}	The lowest frequency of the uplink *operating band*
F_{UL_high}	The highest frequency of the uplink *operating band*
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 resources 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
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 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 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
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 another radio is assisted with another 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

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 (MU). The test specification TS 38.521-3 [5] defines test tolerances (TT). 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 either the “Never fail a good DUT” principle for test tolerance equal to measurement uncertainty (TT = MU) or “Shared Risk” principle for Test Tolerance equal to 0 (TT = 0) Test tolerances lower that measurement uncertainty and greater than 0 (0 < TT < MU) are also considered in this specification..

The “Never fail a good DUT” and the “Shared Risk”principles are 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 CA apply under the assumption of the same uplink-downlink and special subframe configurations in the PCell and SCells for SA.

4.2.1 Test coverage across 5G NR architecture options

The test cases in this specification cover Standalone FR1 radio transmission and reception performance. Below shall be the understanding with respect to coverage across 5G NR architecture options:

1) Only one SA architecture option type is identified and utilized in the definition of each test case. SA test cases in this test specification are configured using *Connectivity NR* i.e. SA Option 2, which shall be the default architecture option used for SA test execution.

2) Testing using SA Option 5 is FFS.

A terminal which supports an inter-band EN-DC configuration shall support all specified E-UTRA bandwidth combination set that belong to the E-UTRA CA configuration part of E-UTRA – NR DC and shall support all specified NR bandwidth combination set that belong to the NR CA configuration part of E-UTRA – NR DC.

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.

4.3 Specification suffix information

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

Table 4.3-1: Definition of suffixes

Clause suffix	Variant
None	Single Carrier
A	Carrier Aggregation (CA)
B	Dual-Connectivity (DC)
C	Supplement Uplink (SUL)
D	UL MIMO

4.4 Test points analysis

The information on test point analysis and test point selection including number of test points for each test case is shown in TR 38.905 [7] clause 4.3.

4.5 Applicability and test coverage rules

(1) The applicability and test coverage rules for EN-DC only capable devices shall include the following:

(a) Test all the EN-DC exception test requirements as per test procedures in TS38.521-3.

(b) Test all the EN-DC FR2 non-exception test requirements in TS38.521-3 with test procedures which refer appropriately back to TS38.521-2. Test only one EN-DC combination per FR2 band for each EN-DC configuration as defined in section 5.5B of 38.101-3 using LTE anchor agnostic approach.

(c) Test all the EN-DC FR1 non-exception test requirements in TS38.521-3 with test procedures which refer appropriately back to TS38.521-1. Test only one EN-DC combination per FR1 band for each EN-DC configuration as defined in section 5.5B of 38.101-3using LTE anchor agnostic approach.

(2) The applicability and test coverage rules for Standalone and EN-DC capable devices shall include the following:

(a) Test all the EN-DC exception test requirements as per test procedures in TS38.521-3.

(b) Test all the Standalone FR2 test requirements as per test procedures in TS38.521-2. This also fulfils coverage for all non-exception EN-DC FR2 test requirements and need not be retested. If Standalone FR2 cannot be tested (due to test case not being complete), then test in EN-DC mode following (1)(b) above.

(c) Test all the Standalone FR1 test requirements as per test procedures in TS38.521-1. This also fulfils coverage for all non-exception EN-DC FR1 test requirements and need not be retested. If Standalone FR1 cannot be tested (due to test case not being complete), then test in EN-DC mode following (1)(c) above.

4.5.1 Test coverage across 5G NR architecture options

The test cases in this specification cover both Standalone (FR1+FR2 CA without DC) as well as Non-Standalone FR1 and FR2 (E-UTRA and 5G NR interworking) testing. Below shall be the understanding with respect to coverage across 5G NR architecture options:

1) Unless otherwise stated within the test case, it shall be understood that test requirements are agnostic of the NSA architecture option configured within the test. The test coverage across NSA options shall be considered fulfilled by execution of the NSA test case in one NSA option Subsequently the test execution and test results can be leveraged to other NSA options.

2) Only one SA or NSA architecture option type is identified and utilized in the definition of each test case within this test specification. NSA test cases are configured using *Connectivity EN-DC* i.e. NSA Option 3 and Standalone (SA) test cases are configured using *Connectivity NR* i.e. SA Option 2 which shall be the default architecture options used for NSA and SA test execution respectively.

3) If a UE does not support NSA Option 3, any other supported NSA option can be configured to execute the test. This is accomplished by appropriately picking the generic procedure paremeter from Table 4.5.1-2. The leverage rule detailed in (1) would apply.

Table 4.5.1-1: Generic procedure parameter summary for SA

Generic Procedure Parameter to use in Initial Conditions		Description	5G NR SA Architecture Option supported by UE
Connectivity	*NR*	NG-RAN NR Radio Access	SA Option 2
	E-UTRA	NG-RAN E-UTRA Radio Access	SA Option 5

Editor's Note: Any additional test config details needed for SA Option 5 is FFS.

Table 4.5.1-2: Generic procedure parameter summary for NSA

Generic Procedure Parameter to use in Initial Conditions		Description	5G NR NSA Architecture Option supported by UE
Connectivity	**NSA**		
	EN-DC	E-UTRA-NR Dual Connectivity	NSA Option 3
	NGEN-DC	NG-RAN E-UTRA-NR Dual Connectivity	NSA Option 4
	NE-DC	NR-E-UTRA Dual Connectivity	NSA Option 7

Editor's Note: Any additional test config details needed for NSA Options 4 and 7 are FFS.

4.6 E-UTRA configuration for EN-DC FR1 tests applying the E-UTRA anchor-agnostic approach

This section applies to EN-DC test cases where E-UTRA anchor needs to be configured as per the anchor-agnostic approach outlined in section 6.1 and 7.1 of TS 38.101-3 [4].The LTE anchor-agnostic approach is defined as measurements on the NR carrier under conditions where the LTE anchor resources do not interfere with NR operation. The configuration defined in this section ensures establishment of such conditions.

For baseline configuration, the E-UTRA carrier will be configured for each test case in section 6 and 7 as defined in the equivalent standalone E-UTRA test in TS 36.521-1. However, the below exceptions defined in Table 4.6-1, 4.6-2, 4.6-3, 4.6-4 and 4.6-5 are applied to ensure that the E-UTRA anchor resources do not interfere with NR operation.

Table 4.6-1: E-UTRA configuration for EN-DC FR1 tests applying anchor agnostic approach

Parameter	Value	Comments
Test Frequency during and after connection setup	Mid (See Table 4.6-2)	As defined in TS 36.508 for the LTE band under test
Bandwidth during and after connection setup	5 MHz (See Table 4.6-2)	Supported by all LTE bands.
DL signal levels during connection setup	RS EPRE -85.0 dBm/15kHz	DL physical channels as defined in Annex C0, C.1, C.2 and Annex C.3 of TS 36.521-1 36.521-1 annex C.0 defines the default DL power level of RS EPRE to be -85dBm/15kHz.
UL Signal levels during connection setup	PUSCH Power	Attained by enabling open loop power control and setting up UL signal levels according to Annex H.0, H.2 and H.3 of TS 36.521-1
DL/UL RMC after connection setup	0 RB allocation on both DL and UL (see Table 4.6-2)	Once the LTE link is established, then LTE Tx can be restricted by configuring 0 RB allocation on DL and UL. *TimeAlignmentTimerDedicated* IE to be set to infinity to ensure UE doesn't look for TA adjustments (See Table 4.6-5)
CQI Reports and SRS after connection setup	Disabled (See Table 4.6-3 and 4.6-4)	Disable periodic and aperiodic CQI reports to ensure none of these transmissions occur on the LTE uplink. Since LTE transmissions could easily exceed spurious emissions limits, tests that are intended to measure RF parametrics on the NR should simply avoid LTE transmit altogether.

Table 4.6-2: E-UTRA Test Configuration Table

E-UTRA Test Parameters					
E-UTRA Channel Bandwidth	E-UTRA Test Frequency	Downlink		Uplink	
		Modulation	RB allocation	Modulation	RB allocation
5 MHz[2]	MidRange[1]	N/A	0	N/A	0
NOTE 1: E-UTRA Test Frequency as specified in TS 36.508 [11] subclause 4.3.1. NOTE 2: For EN-DC Intra-band tests that need to apply E-UTRA anchor agnostic approach, refer to and pick applicable E-UTRA channel bandwidth from subclause 5.3B.1 and indicate within test case if it is different than 5 MHz.					

Table 4.6-3: *CQI-ReportConfig-DEFAULT:* Additional E-UTRA Anchor Configuration

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-2 CQI-ReportConfig-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	NOT PRESENT		
cqi-ReportPeriodic	NOT PRESENT		
}			

Table 4.6-4: *PhysicalConfigDedicated-DEFAULT:* Additional E-UTRA Anchor Configuration

Derivation Path: TS 36.508 [7] clause 4.8.2, Table 4.8.2.1.6-1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
soundingRS-UL-ConfigDedicated	Not present		RBC
}			

Table 4.6-5: *MAC-MainConfig-RBC*: Additional E-UTRA Anchor Configuration

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1 MAC-MainConfig-RBC			
Information Element	**Value/remark**	**Comment**	**Condition**
timeAlignmentTimerDedicated	Infinity		

4.7 E-UTRA configuration for EN-DC FR2 tests applying the E-UTRA anchor-agnostic approach

This section applies to EN-DC test cases where E-UTRA anchor needs to be configured as per the anchor-agnostic approach outlined in section 6.1 and 7.1 of TS 38.101-3 [4].The LTE anchor-agnostic approach is defined as measurements on the NR carrier under conditions where the LTE anchor resources do not interfere with NR operation. The configuration defined in this section ensures establishment of such conditions.

For baseline configuration, the E-UTRA carrier will be configured for each test case in section 6 and 7 as defined in the equivalent standalone E-UTRA test in TS 36.521-1. However, the below exceptions defined in Table 4.7-1 to 4.7-7 are applied to ensure that the E-UTRA anchor resources do not interfere with NR operation.

Table 4.7-1: E-UTRA configuration for EN-DC FR2 tests applying anchor agnostic approach

Parameter	Value	Comments
Test Frequency during and after connection setup	Mid (See Table 4.7-2)	As defined in TS 36.508 for the LTE band under test
Bandwidth during and after connection setup	5 MHz (See Table 4.7-2)	Supported by all LTE bands.
DL signal levels	See table 4.7-3	DL physical channels as defined in Annex C0, C.1, C.2 and Annex C.3 of TS 36.521-1
UL Signal levels for connection setup and UBF transmission	PUSCH Power	Attained by enabling open loop power control and setting up UL signal levels according to Annex H.0, H.2 and H.3 of TS 36.521-1 with the exception for power control message exception defined in Table 4.7-5
DL/UL RMC after connection setup except for UBF transmission	0 RB allocation on both DL and UL (see Table 4.7-2)	Once the LTE link is established, then LTE Tx can be restricted by configuring 0 RB allocation on DL and UL. *TimeAlignmentTimerDedicated* IE to be set to infinity to ensure UE doesn't look for TA adjustments (See Table 4.7-7)
CQI Reports and SRS after connection setup	Disabled (See Table 4.7-4 and 4.7-6)	Disable periodic and aperiodic CQI reports to ensure none of these transmissions occur on the LTE uplink. Since LTE transmissions could easily exceed spurious emissions limits, tests that are intended to measure RF parametrics on the NR should simply avoid LTE transmit altogether.

Table 4.7-2: E-UTRA Test Configuration Table

E-UTRA Test Parameters					
E-UTRA Channel Bandwidth	**E-UTRA Test Frequency**	**Downlink**		**Uplink**	
		Modulation	**RB allocation**	**Modulation**	**RB allocation**
5 MHz[2]	MidRange[1]	N/A	0	N/A	0
NOTE 1: E-UTRA Test Frequency as specified in TS 36.508 [11] subclause 4.3.1 NOTE 2: For EN-DC Intra-band tests that need to apply E-UTRA anchor agnostic approach, refer to and pick applicable E-UTRA channel bandwidth from subclause 5.3B.1 and indicate within test case if it is different than 5 MHz.					

Table 4.7-3: Default Downlink power levels for E-UTRA anchor

	Unit	Band Group	Channel Bandwidth					
			1.4 MHz	3 MHz	5MHz	10MHz	15 MHz	20 MHz
RS EPRE	dBm/15kHz	FDD_A, TDD_A	N/A	N/A	≥ -120.0	N/A	N/A	N/A
		FDD_B1, TDD_B1	N/A	N/A	≥ -119.5	N/A	N/A	N/A
		FDD_C, TDD_C	N/A	N/A	≥ -119.0	N/A	N/A	N/A
		FDD_D, TDD_D	N/A	N/A	≥ -118.5	N/A	N/A	N/A
		FDD_E, TDD_E	N/A	N/A	≥ -118.0	N/A	N/A	N/A
		FDD_G, TDD_G	N/A	N/A	≥ -117.0	N/A	N/A	N/A
		FDD_H, TDD_H	N/A	N/A	≥ -116.5	N/A	N/A	N/A
		FDD_N, TDD_N	N/A	N/A	≥ -113.5	N/A	N/A	N/A
Note 1: The power level is specified at RSRP reference point as defined in TS 36.214 [21] Note 2: E-UTRA Band groups are defined in TS 36.133 [12] clause 3.5.1.								

Table 4.7-4: *CQI-ReportConfig-DEFAULT:* Additional E-UTRA Anchor Configuration

Derivation Path: TS 36.508 [7] clause 4.6.3, Table 4.6.3-2 CQI-ReportConfig-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
CQI-ReportConfig-DEFAULT ::= SEQUENCE {			
cqi-ReportModeAperiodic	NOT PRESENT		
cqi-ReportPeriodic	NOT PRESENT		
}			

Table 4.7-5: UplinkPowerControlCommon-DEFAULT : Additional E-UTRA Anchor Configuration

Derivation Path: TS 36.508 [7] clause 4.6.3, UplinkPowerControlCommon-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
UplinkPowerControlCommon-DEFAULT ::= SEQUENCE {			
p0-NominalPUSCH	-60 (-60 dBm)	To attain maximum power from the DUT	
}			

Table 4.7-6: *PhysicalConfigDedicated-DEFAULT:* Additional E-UTRA Anchor Configuration

Derivation Path: TS 36.508 [7] clause 4.8.2, Table 4.8.2.1.6-1 PhysicalConfigDedicated-DEFAULT			
Information Element	**Value/remark**	**Comment**	**Condition**
PhysicalConfigDedicated-DEFAULT ::= SEQUENCE {			
soundingRS-UL-ConfigDedicated	Not present		RBC
}			

Table 4.7-7: *MAC-MainConfig-RBC*: Additional E-UTRA Anchor Configuration

Derivation Path: TS 36.508 [7] clause 4.8.2.1.5, Table 4.8.2.1.5-1 MAC-MainConfig-RBC			
Information Element	**Value/remark**	**Comment**	**Condition**
timeAlignmentTimerDedicated	Infinity		

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	450 MHz – 6000 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 is 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.

Table 5.2A.1-1: Band combinations for inter-band NR CA between FR1 and FR2

NR CA Band	NR Band
CA_n8-n258	**n8, n258**
CA_n71A_n257[1]	n71, n257
CA_n77A-n257[1]	n77, n257
CA_n78A-n257[1]	n78, n257
CA_n79A-n257[1]	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 for operation with EN-DC or NGEN-DC, NR-DC configured. The EN-DC or NGEN-DC band combinations include at least one E-UTRA operating band.

For EN-DC configurations indicated by column "Single Uplink allowed" (e.g., problematic band combinations as defined in TS38.306) in tables in this section 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 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 case for the EN-DC configurations listed in tables in this section for which the intermodulation products caused by the dual and triple uplink operation fall into the receive band but do not interfere with the own primary downlink channel bandwidth 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 5.2B.2.1-1, Table 5.2B.3.1-1, Table 5.2B.4.1-1 apply.

5.2B.2 Intra-band contiguous EN-DC

5.2B.2.1 EN-DC

Table 5.2B.2.1-1: Band combinations for intra-band contiguous EN-DC

EN-DC band	E-UTRA Band	NR Band	Single UL allowed
DC_(n)71	71	n71	No[3]
DC_(n)41	41	n41	Yes[1]
NOTE 1: Single UL allowed due to potential emission issues, not self-interference. NOTE 2: The minimum requirements apply for 15 kHz subcarrier spacing on the SCG. NOTE 3: 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.			

5.2B.3 Intra-band non-contiguous EN-DC

5.2B.3.1 EN-DC

Table 5.2B.3.1-1: Band combinations for intra-band non-contiguous EN-DC

EN-DC Band Uplink Combination	E-UTRA Band	NR Band	Single UL allowed
DC_3_n3	3	n3	Yes[1]
DC_41_n41	41	n41	Yes
NOTE 1: Only single switched UL is supported in Rel.15			

5.2B.3.2 Void

5.2B.4 Inter-band EN-DC within FR1

5.2B.4.1 EN-DC (two bands)

Table 5.2B.4.1-1: Band combinations for inter-band EN-DC within FR1 (two bands)

EN-DC band	E-UTRA Band	NR Band	Single UL allowed
DC_1_n28	1	n28	No
DC_1_n40	1	n40	No
DC_1_n51	1	n51	No
DC_1_n77[3]	1	n77	DC_1_n77
DC_1_n78[3]	1	n78	No
DC_1_n79[3]	1	n79	No
DC_2_n5	2	n5	No
DC_2_n66	2	n66	DC_2_n66
DC_2_n71	2	n71	No
DC_2_n78	2	n78	DC_2_n78
DC_3_n7	3	n7	No
DC_3_n28	3	n28	No
DC_3_n40	3	n40	No
DC_3_n51	3	n51	No
DC_3_n77[3]	3	n77	DC_3_n77
DC_3_n78[3]	3	n78	DC_3_n78
DC_3_n79[3]	3	n79	No
DC_5_n40	5	n40	No
DC_5_n66	5	n66	DC_5_n66
DC_5_n78[3]	5	n78	No
DC_7_n28	7	n28	No
DC_7_n51	7	n51	No
DC_7_n78[3]	7	n78	No
DC_7-7_n78[3]	CA_7-7	n78	No
DC_8_n40	8	n40	No
DC_8_n77[3]	8	n77	No
DC_8_n78[3]	8	n78	No
DC_8_n79[3]	8	n79	No
DC_11_n77[3]	11	n77	No
DC_11_n78[3]	11	n78	No
DC_11_n79[3]	11	n79	No
DC_12_n5	12	n5	No
DC_12_n66	12	n66	No
DC_18_n77[3]	18	n77	No
DC_18_n78[3]	18	n78	No
DC_18_n79[3]	18	n79	No
DC_19_n77[3]	19	n77	No
DC_19_n78[3]	19	n78	No
DC_19_n79[3]	19	n79	No
DC_20_n8	20	n8	DC_20_n8
DC_20_n28[4]	20	n28	No
DC_20_n51	20	n51	No
DC_20_n77	20	n77	No
DC_20_n78[3]	20	n78	No
DC_21_n77[3]	21	n77	No
DC_21_n78[3]	21	n78	No

EN-DC band	E-UTRA Band	NR Band	Single UL allowed
DC_21_n79[3]	21	n79	No
DC_25_n41	25	n41	No
DC_26_n41[3]	26	n41	No
DC_26_n77[3]	26	n77	No
DC_26_n78[3]	26	n78	No
DC_26_n79[3]	26	n79	No
DC_28_n51	28	n51	No
DC_28_n77[3]	28	n77	No
DC_28_n78[3]	28	n78	No
DC_28_n79[3]	28	n79	No
DC_30_n5	30	n5	No
DC_30_n66	30	n66	No
DC_38_n78	38	n78	No
DC_39_n78[1,3]	39	n78	No
DC_39_n79[3]	39	n79	No
DC_40_n77	40	n77	No
DC_41_n77	41	n77	No
DC_41_n78	41	n78	No
DC_41_n79[2,3]	41	n79	No
DC_42_n51	42	n51	No
DC_42_n77[5]	42	n77	N/A
DC_42_n78[5]	42	n78	N/A
DC_42_n79[5]	42	n79	N/A
DC_66_n71	66	n71	No
DC_66_n5	66	n5	DC_66_n5
DC_66_n78	66	n78	No

NOTE 1: The frequency range above 3600MHz for Band n78 is not used in this combination.
NOTE 2: The frequency range below 2506MHz for Band 41 is not used in this combination.
NOTE 3: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability.
NOTE 4: The frequency range in band 28 is restricted for this band combination to 703-733 MHz for the UL and 758-788 MHz for the DL.
NOTE 5: The combination is not used alone as fall back mode of other band combinations in which UL in Band 42 is not used.

5.2B.4.2 EN-DC (three bands)

Table 5.2B.4.2-1: Band combinations for inter-band EN-DC within FR1 (three bands)

EN-DC Band	E-UTRA Band	NR Band	Single UL allowed
DC_1-3_n28	CA_1-3	n28	No
DC_1-3_n77[2]	CA_1-3	n77	DC_1_n77, DC_3_n77
DC_1-3_n78[2]	CA_1-3	n78	DC_3_n78
DC_1-3_n79[2]	CA_1-3	n79	No
DC_1-5_n78[2]	CA_1-5	n78	No
DC_1-7_n28[2]	CA_1-7	n28	No
DC_1-7_n78 [2]	CA_1-7	n78	No
DC_1-7-7_n78[2]	CA_1-7-7	n78	No
DC_1-8_n78[2]	CA_1-8	n78	No
DC_1-18_n77[2]	CA_1-18	n77	DC_1_n77
DC_1-18_n78[2]	CA_1-18	n78	No
DC_1-18_n79	CA_1-18	n79	No
DC_1-19_n77[2]	CA_1-19	n77	DC_1_n77
DC_1-19_n78[2]	CA_1-19	n78	No
DC_1-19_n79[2]	CA_1-19	n79	No
DC_1-20_n28[3]	CA_1-20	n28	No
DC_1-20_n78[2]	CA_1-20	n78	No
DC_1-21_n77[2]	CA_1-21	n77	DC_1_n77
DC_1-21_n78[2]	CA_1-21	n78	No
DC_1-21_n79[2]	CA_1-21	n79	No
DC_1-28_n77[2]	CA_1-28	n77	DC_1_n77
DC_1-28_n78[2]	CA_1-28	n78	No
DC_1-28_n79	CA_1-28	n79	No
DC_1_n28-n78[2]	1	CA_n28-n78	No
DC_1_n77-n79	1	CA_n77-n79	No
DC_1_n78-n79	1	CA_n78-n79	No
DC_1-41_n77	CA_1-41	n77	DC_1_n77
DC_1-41_n78	CA_1-41	n78	No
DC_1-41_n79	CA_1-41	n79	No
DC_1-42_n77	CA_1-42	n77	DC_1_n77
DC_1-42_n78	CA_1-42	n78	No
DC_1-42_n79	CA_1-42	n79	No
DC_1_SUL_n78-n84[2]	1	SUL_n78-n84	No
DC_2-5_n66	CA_2-5	n66	No
DC_2-12_n66	CA_2-12	n66	No
DC_2-30_n66	CA_2-30	n66	No
DC_2-(n)71	CA_2-71	n71	No
DC_2-66_n71	CA_2-66	n71	No
DC_3_n3-n77	3	CA_n3-n77	DC_3_n3
DC_3_n3-n78	3	CA_n3-n78	DC_3_n3
DC_3-5_n78[2]	CA_3-5	n78	DC_3_n78
DC_3-7_n28	CA_3-7	n28	No
DC_3-7_n78[2]	CA_3-7	n78	DC_3_n78
DC_3-7-7_n78[2]	CA_3-7-7	n78	DC_3_n78
DC_3-8_n78	CA_3-8	n78	DC_3_n78
DC_3-19_n77[2]	CA_3-19	n77	DC_3_n77

EN-DC Band	E-UTRA Band	NR Band	Single UL allowed
DC_3-19_n78[2]	CA_3-19	n78	DC_3_n78
DC_3-19_n79[2]	CA_3-19	n79	No
DC_3-20_n28[2,3]	CA_3-20	n28	No
DC_3-20_n78[2]	CA_3-20	n78	DC_3_n78
DC_3-21_n77[2]	CA_3-21	n77	DC_3_n77
DC_3-21_n78[2]	CA_3-21	n78	DC_3_n78
DC_3-21_n79[2]	CA_3-21	n79	No
DC_3-28_n78[2]	CA_3-28	n78	No
DC_3_n28-n78[2]	3	CA_n28-n78	DC_3_n78
DC_3-28_n79	3	CA_n28-n79	No
DC_3-38_n78	CA_3-38	n78	DC_3_n78
DC_3-41_n78	CA_3-41	n78	DC_3_n78
DC_3-42_n77	CA_3-42	n77	DC_3_n77
DC_3-42_n78	CA_3-42	n78	DC_3_n78
DC_3-42_n79	CA_3-42	n79	No
DC_3_n77-n79	3	CA_n77-n79	No
DC_3_n78-n79	3	CA_n78-n79	DC_3_n78
DC_3_SUL_n78-n80[2]	3	SUL_n78-n80	DC_3_n78
DC_3_SUL_n78-n82[2]	3	SUL_n78-n82[1]	DC_3_n78
DC_3_SUL_n79-n80[2]	3	SUL_n79-n80	No
DC_5-7-7_n78	CA_5-7-7	n78	No
DC_5-7_n78	CA_5-7	n78	No
DC_5-30_n66	CA_5-30	n66	DC_5_n66
DC_7-20_n28[3]	CA_7-20	n28	No
DC_7-20_n78[2]	CA_7-20	n78	No
DC_7-28_n78[2]	CA_7-28	n78	No
DC_7_n28-n78[2]	7	CA_n28-n78	No
DC_7-46_n78	CA_7-46	n78	No
DC_8_SUL_n78-n81[2]	8	SUL_n78-n81	No
DC_8_SUL_n79-n81[2]	8	SUL_n79-n81	No
DC_12-30_n66	CA_12-30	n66	No
DC_18-28_n77[2]	CA_18-28	n77	No
DC_18-28_n78[2]	CA_18-28	n78	No
DC_18-28_n79[2]	CA_18-28	n79	No
DC_19-21_n77[2]	CA_19-21	n77	No
DC_19-21_n78[2]	CA_19-21	n78	No
DC_19-21_n79[2]	CA_19-21	n79	No
DC_19-42_n77	CA_19-42	n77	No
DC_19-42_n78	CA_19-42	n78	No
DC_19-42_n79	CA_19-42	n79	No
DC_19_n77-n79	19	CA_n77-n79	No
DC_19_n78-n79	19	CA_n78-n79	No
DC_20_n8-n75	20	CA_n8-n75	DC_20_n8
DC_20_n28-n75[3]	20	CA_n28-n75	No
DC_20_n28-n78[2,3]	20	CA_n28-n78	No
DC_20_n75-n78[2]	20	CA_n75-n78	No

EN-DC Band	E-UTRA Band	NR Band	Single UL allowed
DC_20_n76-n78[2]	20	CA_n76-n78	No
DC_20_SUL_n78-n82[2]	20	SUL_n78-n82	No
DC_20_SUL_n78-n83[2]	20	SUL_n78-n83[1]	No
DC_21-42_n77	CA_21-42	n77	No
DC_21-42_n78	CA_21-42	n78	No
DC_21-42_n79	CA_21-42	n79	No
DC_21_n77-n79	21	CA_n77-n79	No
DC_21_n78-n79	21	CA_n78-n79	No
DC_28-42_n77	CA_28-42	n77	No
DC_28-42_n78	CA_28-42	n78	No
DC_28-42_n79	CA_28-42	n79	No
DC_41-42_n77	CA_41-42	n77	No
DC_41-42_n78	CA_41-42	n78	No
DC_41-42_n79	CA_41-42	n79	No
DC_28_SUL_n78-n83[2]	28	SUL_n78-n83	No
DC_66_(n)71	CA_66-71	n71	No
DC_66_SUL_n78-n86[2]	66	SUL_n78-n86	DC_66_n78

NOTE 1: If a UE is configured with both NR UL and NR SUL carriers in a cell, the switching time between NR UL carrier and NR SUL carrier can be up to 140us and placed in SUL resources.

NOTE 2: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability

NOTE 3: The frequency range in band 28 is restricted for this band combination to 703-733 MHz for the UL and 758-788 MHz for the DL.

5.2B.4.3 EN-DC (four bands)

Table 5.2B.4.3-1: Band combinations for inter-band EN-DC within FR1 (four bands)

EN-DC Band	E-UTRA Band	NR Band	Single UL allowed
DC_1-3-5_n78[1]	CA_1-3-5	n78	DC_3_n78
DC_1-3-7_n28	CA_1-3-7	n28	No
DC_1-3-7-7_n78[1]	CA_1-3-7-7	n78	DC_3_n78
DC_1-3-7_n78[1]	CA_1-3-7	n78	DC_3_n78
DC_1-3-8_n78[1]	CA_1-3-8	n78	DC_3_n78
DC_1-3-28_n77[1]	CA_1-3-28	n77	DC_1_n77, DC_1_n77
DC_1-3-28_n78[1]	CA_1-3-28	n78	DC_3_n78
DC_1-3_n28-n78[1]	CA_1-3	CA_n28-n78	DC_3_n78
DC_1-3-28_n79[1]	CA_1-3-28	n79	No
DC_1-3-19_n77[1]	CA_1-3-19	n77	DC_1_n77, DC_3_n77
DC_1-3-19_n78[1]	CA_1-3-19	n78	DC_3_n78
DC_1-3-19_n79[1]	CA_1-3-19	n79	No
DC_1-3-20_n28[2]	CA_1-3-20	n28	No
DC_1-3-20_n78[1]	CA_1-3-20	n78	DC_3_n78
DC_1-3-21_n77[1]	CA_1-3-21	n77	DC_1_n77, DC_3_n77
DC_1-3-21_n78[1]	CA_1-3-21	n78	DC_3_n78
DC_1-3-21_n79[1]	CA_1-3-21	n79	No
DC_1-3-42_n77	CA_1-3-42	n77	DC_1_n77, DC_3_n77
DC_1-3-42_n78	CA_1-3-42	n78	DC_3_n78
DC_1-3-42_n79	CA_1-3-42	n79	No
DC_1-5-7_n78	CA_1-5-7	n78	No
DC_1-5-7-7_n78	CA_1-5-7-7	n78	No
DC_1-7-20_n28[2]	CA_1-7-20	n28	No
DC_1-7-20_n78[1]	CA_1-7-20	n78	No
DC_1-7_n28-n78[1]	CA_1-7	CA_n28-n78	No
DC_1-18-28_n77	CA_1-18-28	n77	No
DC_1-18-28_n78	CA_1-18-28	n78	No
DC_1-18-28_n79[1]	CA_1-18-28	n79	No
DC_1-19-42_n77	CA_1-19-42	n77	DC_1_n77
DC_1-19-42_n78	CA_1-19-42	n78	No
DC_1-19-42_n79	CA_1-19-42	n79	No
DC_1-20_n28-n78[1,2]	CA_1-20	CA_n28-n78	No
DC_1-21-28_n77[1]	CA_1-21-28	n77	DC_1_n77
DC_1-21-28_n78[1]	CA_1-21-28	n78	No
DC_1-21-28_n79[1]	CA_1-21-28	n79	No
DC_1-21-42_n77	CA_1-21-42	n77	DC_1_n77
DC_1-21-42_n78	CA_1-21-42	n78	No
DC_1-21-42_n79	CA_1-21-42	n79	No
DC_1-28-42_n77	CA_1-28-42	n77	DC_1_n77
DC_1-28-42_n78	CA_1-28-42	n78	No
DC_1-28-42_n79	CA_1-28-42	n79	No
DC_1-41-42_n77	CA_1-41-42	n77	DC_1_n77
DC_1-41-42_n78	CA_1-41-42	n78	No
DC_1-41-42-n79	CA_1-41-42	n79	No
DC_2-66-(n)71	CA_2-66-71	n71	
DC_3-5-7_n78	CA_3-5-7	n78	DC_3_n78

EN-DC Band	E-UTRA Band	NR Band	Single UL allowed
DC_3-5-7-7_n78	CA_3-5-7-7	n78	DC_3_n78
DC_3-7-20_n28[2]	CA_3-7-20	n28	No
DC_3-7-20_n78[1]	CA_3-7-20	n78	DC_3_n78
DC_3-7-28_n78[1]	CA_3-7-28	n78	DC_3_n78
DC_3-7_n28-n78[1]	CA_3-7	CA_n28-n78	DC_3_n78
DC_3-19-21_n77[1]	CA_3-19-21	n77	DC_3_n77
DC_3-19-21_n78[1]	CA_3-19-21	n78	DC_3_n78
DC_3-19-21_n79[1]	CA_3-19-21	n79	No
DC_3-19-42_n77	CA_3-19-42	n77	DC_3_n77
DC_3-19-42_n78	CA_3-19-42	n78	DC_3_n78
DC_3-19-42_n79[1]	CA_3-19-42	n79	No
DC_3-20_n28-n78[1,2]	CA_3-20	CA_n28-n78	DC_3_n78
DC_3-21-42_n77	DC_3-21-42	n77	DC_3_n77
DC_3-21-42_n78	DC_3-21-42	n78	DC_3_n78
DC_3-21-42_n79	DC_3-21-42	n79	No
DC_3-28-42_n77	CA_3-28-42	n77	DC_3_n77
DC_3-28-42_n78	CA_3-28-42	n78	DC_3_n78
DC_3-28-42_n79	CA_3-28-42	n79	No
DC_7-20_n28-n78[1,2]	CA_7-20	CA_n28-n78	No
DC_19-21-42_n77	CA_19-21-42	n77	No
DC_19-21-42_n78	CA_19-21-42	n78	No
DC_19-21-42_n79	CA_19-21-42	n79	No
DC_21-28-42_n77	CA_21-28-42	n77	No
DC_21-28-42_n78	CA_21-28-42	n78	No
DC_21-28-42_n79	CA_21-28-42	n79	No
NOTE 1: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability NOTE 2: The frequency range in band 28 is restricted for this band combination to 703-733 MHz for the UL and 758-788 MHz for the DL.			

5.2B.4.4 EN-DC (five bands)

Table 5.2B.4.4-1: Band combinations for inter-band EN-DC within FR1 (five bands)

EN-DC Band	E-UTRA Band	NR Band	Single UL allowed
DC_1-3-5-7_n78	CA_1-3-5-7	n78	DC_3_n78
DC_1-3-5-7-7_n78	CA_1-3-5-7-7	n78	DC_3_n78
DC_1-3-7-20_n28[2]	CA_1-3-7-20	n28	No
DC_1-3-7-20_n78[1]	CA_1-3-7-20	n78	DC_3_n78
DC_1-3-7_n28-n78[1]	CA_1-3-7	CA_n28-n78	DC_3_n78
DC_1-3-19-21_n77[1]	CA_1-3-19-21	n77	DC_1_n77, DC_3_n77
DC_1-3-19-21_n78[1]	CA_1-3-19-21	n78	DC_3_n78
DC_1-3-19-21_n79[1]	CA_1-3-19-21	n79	No
DC_1-3-19-42_n77	CA_1-3-19-42	n77	DC_1_n77, DC_3_n77
DC_1-3-19-42_n78	CA_1-3-19-42	n78	DC_3_n78
DC_1-3-19-42_n79	CA_1-3-19-42	n79	No
DC_1-3-20_n28-n78[1,2]	CA_1-3-20	CA_n28-n78	DC_3_n78
DC_1-3-21-42_n77	CA_1-3-21-42	n77	DC_1_n77, DC_3_n77
DC_1-3-21-42_n78	CA_1-3-21-42	n78	DC_3_n78
DC_1-3-21-42_n79	CA_1-3-21-42	n79	No
DC_1-7-20_n28-n78[1,2]	CA_1-7-20	CA_n28-n78	No
DC_1-19-21-42_n77	DC_1-19-21-42	n77	DC_1_n77
DC_1-19-21-42_n78	DC_1-19-21-42	n78	No
DC_1-19-21-42_n79	DC_1-19-21-42	n79	No
DC_1-3-5-7_n78	CA_1-3-5-7	n78	DC_3_n78
DC_1-3-28-42_n77	CA_1-3-28-42	n77	DC_1_n77, DC_3_n77
DC_1-3-28-42_n78	CA_1-3-28-42	n78	DC_3_n78
DC_1-3-28-42_n79	CA_1-3-28-42	n79	No
DC_1-21-28-42_n77	CA_1-21-28-42	n77	DC_1_n77
DC_1-21-28-42_n78	CA_1-21-28-42	n78	No
DC_1-21-28-42_n79	CA_1-21-28-42	n79	No
DC_3-7-20_n28-n78[1,2]	CA_3-7-20	CA_n28-n78	DC_3_n78
NOTE 1: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability NOTE 2: The frequency range in band 28 is restricted for this band combination to 703-733 MHz for the UL and 758-788 MHz for the DL			

5.2B.4.5 EN-DC (six bands)

Table 5.2B.4.5-1: Band combinations for inter-band EN-DC within FR1 (six bands)

EN-DC Band	E-UTRA Band	NR Band	Single UL allowed
DC_1-3-7-20_n28-n78[1,2]	CA_1-3-7-20	CA_n28-n78	DC_3_n78
NOTE 1: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability NOTE 2: The frequency range in band 28 is restricted for this band combination to 703-733 MHz for the UL and 758-788 MHz for the DL			

5.2B.5 Inter-band EN-DC including FR2

5.2B.5.1 EN-DC (two bands)

Table 5.2B.5.1-1: Band combinations for inter-band EN-DC including FR2 (two bands)

EN-DC Band	E-UTRA Band	NR Band	Single UL allowed
DC_1_n257	1	n257	No
DC_2-2_n257	CA_2-2	n257	No
DC_2_n257	CA_2	n257	No
DC_2_n260	2	n260	No
DC_2_n260	CA_2	n260	No
DC_2-2_n260	CA_2-2	n260	No
DC_3_n257	3	n257	No
DC_3_n258	3	n258	No
DC_5_n257	5	n257	No
DC_5-5_n257	CA_5-5	n257	No
DC_5-5_n260	CA_5-5	n260	No
DC_5_n260	5	n260	No
DC_5_n261	5	n261	No
DC_7-7_n257	CA_7-7	n257	No
DC_7_n257	7	n257	No
DC_7_n258	7	n258	No
DC_8_n257	8	n257	No
DC_8_n258	8	n258	No
DC_11_n257	11	n257	No
DC_12_n260	12	n260	No
DC_13_n257	13	n257	No
DC_13_n260	13	n260	No
DC_18_n257	18	n257	No
DC_19_n257	19	n257	No
DC_20_n258	20	n258	No
DC_21_n257	21	n257	No
DC_26_n257	26	n257	No
DC_28_n257	28	n257	No
DC_28_n258	28	n258	No
DC_30_n260	30	n260	No
DC_39_n258	39	n258	No
DC_41_n257	41	n257	No
DC_41_n258	41	n258	No
DC_42_n257	42	n257	No
DC_48-48_n257	CA_48-48	n257	No
DC_48_n257	CA_48	n257	No
DC_48-48_n260	CA_48-48	n260	No
DC_48_n260	CA_48	n260	No
DC_66-66_n257	CA_66-66	n257	No
DC_66_n257	66	n257	No
DC_66-66_n260	CA_66-66	n260	No
DC_66_n260	66	n260	No
DC_66_n261	66	n261	No
NOTE 1: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability for all of the above combinations			

5.2B.5.2 EN-DC (three bands)

Table 5.2B.5.2-1: Band combinations for inter-band EN-DC including FR2 (three bands)

EN-DC Band	E-UTRA Band	NR Band	Single UL allowed
DC_1-3_n257[1]	CA_1-3	n257	No
DC_1-5_n257[1]	CA_1-5	n257	No
DC_1-7_n257[1]	CA_1-7	n257	No
DC_1-7-7_n257[1]	CA_1-7-7	n257	No
DC_1-8_n257	CA_1-8	n257	No
DC_1-18_n257[1]	CA_1-18	n257	No
DC_1-19_n257[1]	CA_1-19	n257	No
DC_1-21_n257[1]	CA_1-21	n257	No
DC_1-28_n257[1]	CA_1-28	n257	No
DC_1-41_n257	CA_1-41	n257	No
DC_1-42_n257	CA_1-42	n257	No
DC_2-5_n257[1]	CA_2-5	n257	No
DC_2-5_n260	CA_2-5	n260	No
DC_2-12_n260	CA_2-12	n260	No
DC_2-13_n257[1]	CA_2-13	n257	No
DC_2-13_n260[1]	CA_2-13	n260	No
DC_2-30_n260	CA_2-30	n260	No
DC_2-66_n257[1]	CA_2-66	n257	No
DC_2-66_n260	CA_2-66	n260	No
DC_3-5_n257[1]	CA_3-5	n257	No
DC_3-7_n257[1]	CA_3-7	n257	No
DC_3-7-7_n257[1]	CA_3-7-7	n257	No
DC_3-19_n257[1]	CA_3-19	n257	No
DC_3-21_n257[1]	CA_3-21	n257	No
DC_3-28_n257[1]	CA_3-28	n257	No
DC_3-41_n257	CA_3-41	n257	No
DC_3-42_n257[1]	CA_3-42	n257	No
DC_5-7-7_n257[1]	CA_5-7-7	n257	No
DC_5-7_n257[1]	CA_5-7	n257	No
DC_5-30_n260	CA_5-30	n260	No
DC_5-66_n260	CA_5-66	n260	No
DC_12-30_n260	CA_12-30	n260	No
DC_12-66_n260	CA_12-66	n260	No
DC_13-66_n257[1]	CA_13-66	n257	No
DC_13-66_n260[1]	CA_13-66	n260	No
DC_18-28_n257[1]	CA_18-28	n257	No
DC_19-21_n257[1]	CA_19-21	n257	No
DC_19-42_n257[1]	CA_19-42	n257	No
DC_21-42_n257[1]	CA_21-42	n257	No
DC_21-28_n257[1]	CA_21-28	n257	No
DC_28-42_n257[1]	CA_28-42	n257	No
DC_30-66_n260	CA_30-66	n260	No
DC_41-42_n257	CA_41-42	n257	No
NOTE 1: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability			

5.2B.5.3 EN-DC (four bands)

Table 5.2B.5.3-1: Band combinations for inter-band EN-DC including FR2 (four bands)

EN-DC Band	E-UTRA Band	NR Band	Single UL allowed
DC_1-3-5_n257[1]	CA_1-3-5	n257	No
DC_1-3-7_n257[1]	CA_1-3-7	n257	No
DC_1-3-7-7_n257	CA_1-3-7-7	n257	No
DC_1-3-19_n257[1]	CA_1-3-19	n257	No
DC_1-3-21_n257[1]	CA_1-3-21	n257	No
DC_1-3-28_n257[1]	CA_1-3-28	n257	No
DC_1-3-42_n257	CA_1-3-42	n257	No
DC_1-5-7_n257[1]	CA_1-5-7	n257	No
DC_1-5-7-7_n257	CA_1-5-7-7	n257	No
DC_1-18-28_n257[1]	CA_1-18-28	n257	No
DC_1-19-21_n257	CA_1-19-21	n257	No
DC_1-19-42_n257	CA_1-19-42	n257	No
DC_1-21-28_n257[1]	CA_1-21-28	n257	No
DC_1-21-42_n257	CA_1-21-42	n257	No
DC_1-28-42_n257	CA_1-28-42	n257	No
DC_1-41-42_n257	CA_1-41-42	n257	No
DC_3-5-7-7_n257	CA_3-5-7-7	n257	No
DC_3-5-7_n257[1]	CA_3-5-7	n257	No
DC_3-19-21_n257[1]	CA_3-19-21	n257	No
DC_3-19-42_n257	CA_3-19-42	n257	No
DC_3-21-42_n257	CA_3-21-42	n257	No
DC_3-28-42_n257	CA_3-28-42	n257	No
DC_19-21-42_n257[1]	CA_19-21-42	n257	No
DC_21-28-42_n257[1]	CA_21-28-42	n257	No
NOTE 1: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability			

5.2B.5.4 EN-DC (five bands)

Table 5.2B.5.4-1: Band combinations for inter-band EN-DC including FR2 (five bands)

EN-DC Band	E-UTRA Band	NR Band	Single UL allowed
DC_1-3-5-7_n257[1]	CA_1-3-5-7	n257	No
DC_1-3-5-7-7_n257[1]	CA_1-3-5-7-7	n257	No
DC_1-3-19-21_n257[1]	CA_1-3-19-21	n257	No
DC_1-3-19-42_n257	CA_1-3-19-42	n257	No
DC_1-3-21-42_n257	CA_1-3-21-42	n257	No
DC_1-3-28-42_n257	CA_1-3-28-42	n257	No
DC_1-19-21-42_n257	DC_1-19-21-42	n257	No
DC_1-21-28-42_n257	DC_1-21-28-42	n257	No
NOTE 1: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability			

5.2B.6 Inter-band EN-DC including both FR1 and FR2

5.2B.6.1 EN-DC (two bands)

This section is N/A

5.2B.6.2 EN-DC (three bands)

Table 5.2B.6.2-1: Band combinations for inter-band EN-DC including both FR1 and FR2 (three bands)

EN-DC Band	E-UTRA Band	NR Band	Single UL allowed
DC_1_n77-n257	1	CA_n77-n257	No
DC_1_n78-n257	1	CA_n78-n257	No
DC_1_n79-n257	1	CA_n79-n257	No
DC_3_n77-n257	3	CA_n77-n257	DC_3_n77
DC_3_n78-n257	3	CA_n78-n257	DC_3_n78
DC_3_n79-n257	3	CA_n79-n257	No
DC_5_n78-n257[1]	5	CA_n78-n257	No
DC_7-7_n78-n257	CA_7-7	CA_n78-n257	No
DC_7_n78-n257	7	CA_n78-n257	No
DC_19_n77-n257	19	CA_n77-n257	No
DC_19_n78-n257	19	CA_n78-n257	No
DC_19_n79-n257	19	CA_n79-n257	No
DC_21_n77-n257	21	CA_n77-n257	No
DC_21_n78-n257	21	CA_n78-n257	No
DC_21_n79-n257	21	CA_n79-n257	No
NOTE 1: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability			

5.2B.6.3 EN-DC (four bands)

Table 5.2B.6.3-1: Band combinations for inter-band EN-DC including both FR1 and FR2 (four bands)

EN-DC Band	E-UTRA Band	NR Band	Single UL allowed
DC_1-3_n78-n257	CA_1-3	CA_n78-n257	DC_3_n78
DC_1-5_n78-n257	CA_1-5	CA_n78-n257	No
DC_1-7-7_n78-n257	CA_1-7-7	CA_n78-n257	No
DC_1-7_n78-n257	CA_1-7	CA_n78-n257	No
DC_3-5_n78-n257	CA_3-5	CA_n78-n257	DC_3_n78
DC_3-7-7_n78-n257	CA_3-7-7	CA_n78-n257	DC_3_n78
DC_3-7_n78-n257	CA_3-7	CA_n78-n257	DC_3_n78
DC_5-7-7_n78-n257	CA_5-7-7	CA_n78-n257	No
DC_5-7_n78-n257	CA_5-7	CA_n78-n257	No

5.2B.6.4 EN-DC (five bands)

Table 5.2B.6.4-1: Band combinations for inter-band EN-DC including both FR1 and FR2 (five bands)

EN-DC Band	E-UTRA Band	NR Band	Single UL allowed
DC_1-3-5_n78-n257	CA_1-3-5	CA_n78-n257	DC_3_n78
DC_1-3-7-7_n78-n257	CA_1-3-7-7	CA_n78-n257	DC_3_n78
DC_1-3-7_n78-n257	CA_1-3-7	CA_n78-n257	DC_3_n78
DC_1-5-7-7_n78-n257	CA_1-5-7-7	CA_n78-n257	No
DC_1-5-7_n78-n257	CA_1-5-7	CA_n78-n257	No
DC_3-5-7-7_n78-n257	CA_3-5-7-7	CA_n78-n257	DC_3_n78
DC_3-5-7_n78-n257	CA_3-5-7	CA_n78-n257	DC_3_n78

5.2B.6.5 EN-DC (six bands)

Table 5.2B.6.5-1: Band combinations for inter-band EN-DC including both FR1 and FR2 (six bands)

EN-DC Band	E-UTRA Band	NR Band	Single UL allowed
DC_1-3-5-7_n78-n257	CA_1-3-5-7	CA_n78-n257	DC_3_n78
NOTE 1: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability			

5.2B.7 Inter-band NR-DC between FR1 and FR2

5.2B.7.1 NR-DC (two bands)

Table 5.2B.7.1-1: Band combinations for inter-band NR-DC between FR1 and FR2 (two bands)

NR-DC Band	NR Band
DC_n77-n257	n77, n257
DC_n78-n257	n78, n257
DC_n79-n257	n79, n257

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 EN-DC

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 sub-clause 5.4.

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

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.

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

For NR inter-band dual connectivity specified in sub-clause 5.2B.7, the corresponding NR CA configurations in sub-clause 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 section corresponding NR uplink CA between FR1 and FR2 configurations, unless otherwise specified.

Intra-band contiguous EN-DC configurations are defined using intra-band contiguous EN-DC bandwidth class notation where the first EN-DC bandwidth class letter indicates the number of contiguous E-UTRA carriers and the second EN-DC bandwidth class letter indicates the number of contiguous NR carriers. Applicable contiguous intraband EN-DC bandwidth classes are listed in Table 5.3B-1

Table 5.3.B-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 a single operating band supporting 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.

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 LTE carrier (MHz)	Channel bandwidths NR for carrier (MHz)	Channel bandwidths for LTE 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[1], DC_41A_n41A[2]	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[1], DC_41A_n41A[2]	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[3]	15	5		20	0
		10	5, 10			
		5	5, 10, 15			
			5	15		
			5, 10	10		
			5, 10, 15	5		
NOTE 1: Contiguous intra-band EN-DC uplink requirements shall apply. NOTE 2: LTE and NR ACLR requirements and non-contiguous intra-band EN-DC uplink requirements shall apply.						

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

For intra-band non-contiguous EN-DC, an EN-DC configuration is a single operating band supporting 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.

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 LTE carrier (MHz)	Channel bandwidths NR for carrier (MHz)	Channel bandwidths for LTE carrier (MHz)		

DC_3A_n3A	DC_3A_n3A(1)		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.						

5.4 Channel arrangement

5.4A Channel arrangement for CA

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

5.4B Channel arrangement for DC

The channel arrangement for intra-band EN-DC operations in FR1 is specified in sub-clause 5.4B.1 of TS 38.101-1.

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 15 kHz channel raster,

  Nominal Channel spacing = $(BW_{LTE\_Channel} + BW_{NR\_Channel})/2+\{-5kHz, 0kHz, 5kHz\}$

- For NR operating bands with 30 kHz channel raster,

  Nominal Channel spacing = $(BW_{LTE\_Channel} + BW_{NR\_Channel})/2+\{-10kHz, 0kHz, 10kHz\}$

where $BW_{LTE\_Channel}$ and $BW_{NR\_Channel}$ are the channel bandwidths of the E-UTRA and NR carriers. 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 subclause.

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	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			
			60		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			
			60		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes			
		n257	See CA_n257D in Table 5.5A.1-1 in TS 38.521-2 [9]												
CA_n77A-n257E	CA_n77A-n257A	n77	15		Yes	Yes	Yes	Yes	Yes						0
			30		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes			
			60		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes			
		n257	See CA_n257E in Table 5.5A.1-1 in TS 38.521-2 [9]												
CA_n77A-n257F	CA_n77A-n257A	n77	15	Yes	Yes	Yes	Yes	Yes							0
			30	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes				
			60	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes				
		n257	See CA_n257F in Table 5.5A.1-in TS 38.521-2 [9]												
CA_n77C-n257A	CA_n77A-n257A	n77	See CA_n77C in Table 5.5A.1-1 in TS 38.521-1 [8]												0
		n257	60						Yes			Yes	Yes		
			120						Yes			Yes	Yes	Yes	
CA_n77C-n257D	CA_n77A-n257A	n77	See CA_n77C in Table 5.5A.1-1 in TS 38.521-1 [8]												0
		n257	See CA_n257D in Table 5.5A.1-1 in TS 38.521-2 [9]												
CA_n77C-n257E	CA_n77A-n257A	n77	See CA_n77C in Table 5.5A.1-1 in TS 38.521-1 [8]												0
		n257	See CA_n257E in Table 5.5A.1-2 in TS 38.521-2 [9]												
CA_n77C-n257F	CA_n77A-n257A	n77	See CA_n77C in Table 5.5A.1-1 in TS 38.521-1 [8]												0
		n257	See CA_n257F in Table 5.5A.1-2 in TS 38.521-2 [9]												
CA_n78A-n257A	CA_n78A-n257A	n78	15		Yes	Yes	Yes	Yes	Yes						0
			30		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes			
			60		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			
			60		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes			
		n257	See CA_n257D in Table 5.5A.1-1 in TS 38.521-2 [9]												
CA_n78A-n257E	CA_n78A-n257A	n78	15		Yes	Yes	Yes	Yes	Yes						0
			30		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes			
			60		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes			
		n257	See CA_n257E in Table 5.5A.1-1 in TS 38.521-2 [9]												
CA_n78A-n257F	CA_n78A-n257A	n78	15	Yes	Yes	Yes	Yes	Yes							0
			30	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes				
			60	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes				
		n257	See CA_n257F in Table 5.5A.1-1 in TS 38.521-2 [9]												
CA_n78C-n257A	CA_n78A-n257A	n78	See CA_n78C in Table 5.5A.1-1 in TS 38.521-1 [8]												0
		n257	60						Yes			Yes	Yes		
			120						Yes			Yes	Yes	Yes	
CA_n78C-n257D	CA_n78A-n257A	n78	See CA_n78C in Table 5.5A.1-1 in TS 38.521-1 [8]												0
		n257	See CA_n257D in Table 5.5A.1-1 in TS 38.521-2 [9]												
CA_n78C-n257E	CA_n78A-n257A	n78	See CA_n78C in Table 5.5A.1-1 in TS 38.521-1 [8]												0
		n257	See CA_n257E in Table 5.5A.1-1 in TS 38.521-2 [9]												

CA_n78C-n257F	CA_n78A-n257A	n78	See CA_n78C in Table 5.5A.1-1 in TS 38.521-1 [8]												0
		n257	See CA_n257F in Table 5.5A.1-1 in TS 38.521-2 [9]												
CA_n79A-n257A	CA_n79A-n257A	n79	15		Yes	Yes	Yes	Yes	Yes						0
			30		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes			
			60		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes			
		n257	60						Yes			Yes	Yes		
			120						Yes			Yes	Yes	Yes	
CA_n79A-n257D	CA_n79A-n257A	n79	15		Yes	Yes	Yes	Yes	Yes						0
			30		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes			
			60		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes			
		n257	See CA_n257D in Table 5.5A.1-1 in TS 38.521-2 [9]												
CA_n79A-n257E	CA_n79A-n257A	n79	15		Yes	Yes	Yes	Yes	Yes						0
			30		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes			
			60		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes			
		n257	See CA_n257E in Table 5.5A.1-1 in TS 38.521-2 [9]												
CA_n79A-n257F	CA_n79A-n257A	n79	15	Yes	Yes	Yes	Yes	Yes							0
			30	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes				
			60	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes				
		n257	See CA_n257F in Table 5.5A.1-1 in TS 38.521-2 [9]												
CA_n79C-n257A	CA_n79A-n257A	n79	See CA_n79C in Table 5.5A.1-1 in TS 38.521-1 [8]												0
		n257	60						Yes			Yes	Yes		
			120						Yes			Yes	Yes	Yes	
CA_n79C-n257D	CA_n79A-n257A	n79	See CA_n79C in Table 5.5A.1-1 in TS 38.521-1 [8]												0
		n257	See CA_n257D in Table 5.5A.1-2 in TS 38.521-2 [9]												
CA_n79C-n257E	CA_n79A-n257A	n79	See CA_n79C in Table 5.5A.1-1 in TS 38.521-1 [8]												0
		n257	See CA_n257E in Table 5.5A.1-1 in TS 38.521-2 [9]												
CA_n79C-n257F	CA_n79A-n257A	n79	See CA_n79C in Table 5.5A.1-1 in TS 38.521-1 [8]												0
		n257	See CA_n257F in Table 5.5A.1-1 in TS 38.521-2 [9]												

5.5B Configuration for DC

5.5B.1 General

The channel bandwidth and bandwidth classes are specified for operation with EN-DC, NGEN-DC or NR-DC configured.

5.5B.2 Intra-band contiguous EN-DC

Supported channel bandwidths for E-UTRA operating bands are defined in TS 36.521-1 [10] and for NR operating bands in TS 38.521-1 [8].

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

EN-DC configuration	Uplink EN-DC configuration (NOTE 1)	E-UTRA configuration	NR configuration
DC_(n)41AA	DC_(n)41AA	41A	n41A
DC_(n)41CA	DC_(n)41AA, DC_41A_n41A	CA_41C	n41A
DC_(n)41DA	DC_(n)41AA, DC_41A_n41A	CA_41D	n41A
DC_(n)71AA	DC_(n)71AA	71A	n71A[2]
NOTE 1: Uplink CA 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.			

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

Supported channel bandwidths for E-UTRA operating bands are defined in TS 36.521-1 [10] and for NR operating bands in TS 38.521-1 [8].

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

EN-DC configuration	Uplink EN-DC configuration (NOTE 1)	E-UTRA configuration	NR configuration
DC_3A_n3A	DC_3A_n3A[2]	3A	n3A
DC_41A_n41A	DC_41A_n41A	41A	n41A
DC_41C_n41A	DC_41A_n41A	CA_41C	n41A
DC_41D_n41A	DC_41A_n41A	CA_41D	n41A
NOTE 1: Uplink CA configurations are the configurations supported by the present release of specifications. NOTE 2: Only single switched UL is supported in Rel.15.			

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)	E-UTRA configuration	NR configuration
DC_1A_n28A	DC_1A_n28A	1A	n28A
DC_1A_n40A	DC_1A_n40A	1A	n40A
DC_1A_n51A	DC_1A_n51A	1A	n51A
DC_1A_n77A DC_1A_n77C	DC_1A_n77A	1A	n77A CA_n77C
DC_1A_n78A DC_1A_n78C	DC_1A_n78A	1A	n78A CA_n78C
DC_1A_n79A DC_1A_n79C	DC_1A_n79A	1A	n79A CA_n79C
DC_2A_n5A	DC_2A_n5A	2A	n5A
DC_2A_n66A	DC_2A_n66A	2A	n66A
DC_2A_n71A	DC_2A_n71A	2A	n71A
DC_2A_n78A	DC_2A_n78A	2A	n78A
DC_3A_n7A	DC_3A_n7A	3A	n7A
DC_3A_n28A	DC_3A_n28A	3A	n28A
DC_3A_n40A	DC_3A_n40A	3A	n40A
DC_3A_n51A	DC_3A_n51A	3A	n51A
DC_3A_n77A DC_3A_n77C	DC_3A_n77A	3A	n77A CA_n77C
DC_3A_n78A DC_3A_n78C	DC_3A_n78A	3A	n78A CA_n78C
DC_3A_n79A DC_3A_n79C	DC_3A_n79A	3A	n79A CA_n79C
DC_3C_n78A	DC_3A_n78A	CA_3C	n78A
DC_5A_n40A	DC_5A_n40A	5A	n40A
DC_5A_n66A	DC_5A_n66A	5A	n66A
DC_5A_n78A	DC_5A_n78A	5A	n78A
DC_7A-7A_n78A	DC_7A_n78A	CA_7A-7A	n78A
DC_7A_n28A	DC_7A_n28A	7A	n28A
DC_7A_n51A	DC_7A_n51A	7A	n51A
DC_7A_n78A	DC_7A_n78A	7A	n78A
DC_7C_n78A	DC_7C_n78A	CA_7C	n78A
DC_8A_n40A	DC_8A_n40A	8A	n40A
DC_8A_n77A	DC_8A_n77A	8A	n77A
DC_8A_n78A	DC_8A_n78A	8A	n78A
DC_8A_n79A	DC_8A_n79A	8A	n79A
DC_11A_n77A	DC_11A_n77A	11A	n77A
DC_11A_n78A	DC_11A_n78A	11A	n78A
DC_11A_n79A	DC_11A_n79A	11A	n79A
DC_12A_n5A	DC_12A_n5A	12A	n5A
DC_12A_n66A	DC_12A_n66A	12A	n66A
DC_18A_n77A	DC_18A_n77A	18A	n77A
DC_18A_n78A	DC_18A_n78A	18A	n78A
DC_18A_n79A	DC_18A_n79A	18A	n79A
DC_19A_n77A DC_19A_n77C	DC_19A_n77A	19A	n77A CA_n77C
DC_19A_n78A DC_19A_n78C	DC_19A_n78A	19A	n78A CA_n78C
DC_19A_n79A DC_19A_n79C	DC_19A_n79A	19A	n79A CA_n79C
DC_20A_n8A	DC_20A_n8A	20A	n8A

DC_20A_n28A	DC_20A_n28A	20A	n28A
DC_20A_n51A	DC_20A_n51A	20A	n51A
DC_20A_n77A	DC_20A_n77A	20A	n77A
DC_20A_n78A	DC_20A_n78A	20A	n78A
DC_21A_n77A DC_21A_n77C	DC_21A_n77A	21A	n77A CA_n77C
DC_21A_n78A DC_21A_n78C	DC_21A_n78A	21A	n78A CA_n78C
DC_21A_n79A DC_21A_n79C	DC_21A_n79A	21A	n79A CA_n79C
DC_25A_n41A	DC_25A_n41A	25A	n41A
DC_26A_n41A	DC_26A_n41A	26A	n41A
DC_26A_n77A	DC_26A_n77A	26A	n77A
DC_26A_n78A	DC_26A_n78A	26A	n78A
DC_26A_n79A	DC_26A_n79A	26A	n79A
DC_28A n51A	DC_28A_n51A	28A	n51A
DC_28A_n77A DC_28A_n77C	DC_28A_n77A	28A	n77A CA_n77C
DC_28A_n78A DC_28A_n78C	DC_28A_n78A	28A	n78A CA_n78C
DC_28A_n79A DC_28A_n79C	DC_28A_n79A	28A	n79A CA_n79C
DC_30A_n5A	DC_30A_n5A	30A	n5A
DC_30A_n66A	DC_30A_n66A	30A	n66A
DC_38A_n78A	N/A	38A	n78A
DC_39A_n78A	DC_39A_n78A	39A	n78A
DC_39A_n79A	DC_39A_n79A	39A	n79A
DC_40A_n77A	N/A	40A	n77A
DC_41A_n77A	DC_41A_n77A	41A	n77A
DC_41A_n78A	DC_41A_n78A	41A	n78A
DC_41A_n79A	DC_41A_n79A	41A	n79A
DC_41C_n77A	DC_41C_n77A	CA_41C	n77A
DC_41C_n78A	DC_41C_n78A	CA_41C	n78A
DC_41C_n79A	DC_41C_n79A	CA_41C	n79A
DC_42A_n51A	DC_42A_n51A	42A	n51A
DC_42A_n77A DC_42A_n77C	N/A	42A	n77A CA_n77C
DC_42A_n78A DC_42A_n78C	N/A	42A	n78A CA_n78C
DC_42A_n79A DC_42A_n79C	N/A	42A	n79A CA_n79C
DC_42C_n77A	N/A	CA_42C	n77A
DC_42C_n78A	N/A	CA_42C	n78A
DC_42C_n79A	N/A	CA_42C	n79A
DC_42C_n77C	N/A	CA_42C	CA_n77C
DC_42C_n78C	N/A	CA_42C	CA_n78C
DC_42C_n79C	N/A	CA_42C	CA_n79C
DC_42D_n77A	N/A	CA_42D	n77A
DC_42D_n77C	N/A	CA_42D	CA_n77C
DC_42D_n78A	N/A	CA_42D	n78A
DC_42D_n78C	N/A	CA_42D	CA_n78C
DC_42D_n79A	N/A	CA_42D	n79A
DC_42D_n79C	N/A	CA_42D	CA_n79C

DC_42E_n77A	N/A	CA_42E	n77A
DC_42E_n77C	N/A	CA_42E	CA_n77C
DC_42E_n78A	N/A	CA_42E	n78A
DC_42E_n79A	N/A	CA_42E	n79A
DC_42E_n79C	N/A	CA_42E	CA_n79C
DC_46A_n78A[2]	N/A	46A	n78A
DC_46C_n78A[2]	N/A	CA_46C	n78A
DC_46D_n78A[2]	N/A	CA_46D	n78A
DC_46E_n78A[2]	N/A	CA_46E	n78A
DC_66A_n5A	DC_66A_n5A	66A	n5A
DC_66A_n71A	DC_66A_n71A	66A	n71A
DC_66C_n71A	DC_66A_n71A	CA_66C	n71A
DC_66A_n78A	DC_66A_n78A	66A	n78A
NOTE 1: Uplink CA configurations are the configurations supported by the present release of specifications. 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.			

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)	E-UTRA configuration	NR configuration
DC_1A-3A_n28A	DC_1A_n28A DC_3A_n28A	CA_1A-3A	n28A
DC_1A-3A_n77A DC_1A-3A_n77C	DC_1A_n77A DC_3A_n77A	CA_1A-3A	n77A CA_n77C
DC_1A-3A_n78A DC_1A-3A_n78C	DC_1A_n78A DC_3A_n78A	CA_1A-3A	n78A CA_n78C
DC_1A-3A_n79A DC_1A-3A_n79C	DC_1A_n79A DC_3A_n79A	CA_1A-3A	n79A CA_n79C
DC_1A-3C_n78A	DC_1A_n78A DC_3A_n78A	CA_1A-3C	n78A
DC_1A-5A_n78A	DC_1A_n78A DC_5A_n78A	CA_1A-5A	n78A
DC_1A-7A_n28A	DC_1A_n28A DC_7A_n28A	CA_1A-7A	n28A
DC_1A-7A_n78A	DC_1A_n78A DC_7A_n78A	CA_1A-7A	n78A
DC_1A-7A-7A_n78A	DC_1A_n78A DC_7A_n78A	CA_1A-7A-7A	n78A
DC_1A-8A_n78A	DC_1A_n78A DC_8A_n78A	CA_1A-8A	n78A
DC_1A-18A_n77A	DC_1A_n77A DC_18A_n77A	CA_1A-18A	n77A
DC_1A-18A_n78A	DC_1A_n78A DC_18A_n78A	CA_1A-18A	n78A
DC_1A-18A_n79A	DC_1A_n79A DC_18A_n79A	CA_1A-18A	n79A
DC_1A-19A_n77A DC_1A-19A_n77C	DC_1A_n77A DC 19A_n77A	CA_1A-19A	n77A CA_n77C
DC_1A-19A_n78A DC_1A-19A_n78C	DC_1A_n78A DC_19A_n78A	CA_1A-19A	n78A CA_n78C
DC_1A-19A_n79A DC_1A-19A_n79C	DC_1A_n79A DC_19A_n79A	CA_1A-19A	n79A CA_n79C
DC_1A-19A_n77A	DC_1A_n77A DC 19A_n77A	CA_1A-19A	n77A
DC_1A-19A_n78A	DC_1A_n78A DC_19A_n78A	CA_1A-19A	n78A
DC_1A-19A_n79A	DC_1A_n79A DC_19A_n79A	CA_1A-19A	n79A
DC_1A-20A_n28A	DC_1A_n28A DC_20A_n28A	CA_1A-20A	n28A
DC_1A-20A_n78A	DC_1A_n78A DC_20A_n78A	CA_1A-20A	n78A
DC_1A-21A_n77A DC_1A-21A_n77C	DC_1A_n77A DC_21A_n77A	CA_1A-21A	n77A CA_n77C
DC_1A-21A_n78A DC_1A-21A_n78C	DC_1A_n78A DC_21A_n78A	CA_1A-21A	n78A CA_n78C
DC_1A-21A_n79A DC_1A-21A_n79C	DC_1A_n79A DC_21A_n79A	CA_1A-21A	n79A CA_n79C
DC_1A-21A_n77A	DC_1A_n77A DC_21A_n77A	CA_1A-21A	n77A
DC_1A-21A_n78A	DC_1A_n78A DC_21A_n78A	CA_1A-21A	n78A
DC_1A-21A_n79A	DC_1A_n79A DC_21A_n79A	CA_1A-21A	n79A
DC_1A-28A_n77A DC_1A-28A_n77C	DC_1A_n77A DC_28A_n77A	CA_1A-28A	n77A CA_n77C
DC_1A-28A_n78A DC_1A-28A_n78C	DC_1A_n78A DC_28A_n78A	CA_1A-28A	n78A CA_n78C
DC_1A-28A_n79A DC_1A-28A_n79C	DC_1A_n79A DC_28A_n79A	CA_1A-28A	n79A CA_n79C
DC_1A_n28A-n78A	DC_1A_n28A, DC_1A_n78A	1A	CA_n28A-n78A

DC_1A-41A_n77A DC_1A-41C_n77A	DC_1A_n77A DC_41A_n77A DC_41C_n77A	CA_1A-41A CA_1A-41C	n77A
DC_1A-41A_n78A DC_1A-41C_n78A	DC_1A_n78A DC_41A_n78A DC_41C_n78A	CA_1A-41A CA_1A-41C	n78A
DC_1A-41C_n79A	DC_1A_n79A DC_41C_n79A	CA_1A-41C	n79A
DC_1A-42A_n77A DC_1A-42A_n77C	DC_1A_n77A	CA_1A-42A	n77A CA_n77C
DC_1A-42A_n78A DC_1A-42A_n78C	DC_1A_n78A	CA_1A-42A	n78A CA_n78C
DC_1A-42A_n79A DC_1A-42A_n79C	DC_1A_n79A	CA_1A-42A	n79A CA_n79C
DC_1A-42C_n77A DC_1A-42C_n77C	DC_1A_n77A	CA_1A-42C	n77A CA_n77C
DC_1A-42C_n78A DC_1A-42C_n78C	DC_1A_n78A	CA_1A-42C	n78A CA_n78C
DC_1A-42C_n79A DC_1A-42C_n79C	DC_1A_n79A	CA_1A-42C	n79A CA_n79C
DC_1A-42D_n77A DC_1A-42D_n77C	DC_1A_n77A	CA_1A-42D	n77A CA_n77C
DC_1A-42D_n78A DC_1A-42D_n78C	DC_1A_n78A	CA_1A-42D	n78A CA_n78C
DC_1A-42D_n79A DC_1A-42D_n79C	DC_1A_n79A	CA_1A-42D	n79A CA_n79C
DC_1A-42E_n77A DC_1A-42E_n77C	DC_1A_n77A	CA_1A-42E	n77A CA_n77C
DC_1A-42E_n78A DC_1A-42E_n78C	DC_1A_n78A	CA_1A-42E	n78A CA_n78C
DC_1A-42E_n79A DC_1A-42E_n79C	DC_1A_n79A	CA_1A-42E	n79A CA_n79C
DC_1A_n28A-n78A	DC_1A_n28A DC_1A_n78A	1A	CA_n28A-n78A
DC_1A_n77A-n79A	DC_1A_n77A DC_1A_n79A	1A	CA_n77A-n79A
DC_1A_n78A-n79A	DC_1A_n78A DC_1A_n79A	1A	CA_n78A-n79A
DC_1A_SUL_n78A-n84A	DC_1A_n78A, DC_1A_n84A_ULSUP-TDM_n78A, DC_1A_n84A_ULSUP-FDM_n78A	1A	SUL_n78A-n84A
DC_2A-5A_n66A	DC_2A_n66A DC_5A_n66A	CA_2A-5A	n66A
DC_2A-12A_n66A	DC_2A_n66A DC_12A_n66A	CA_2A-12A	n66A
DC_2A-30A_n66A	DC_2A_n66A DC_30A_n66A	CA_2A-30A	n66A
DC_2A-66A_n71A	DC_2A_n71A DC_66A_n71A	CA_2A-66A	n71A
DC_2A-66C_n71A	DC_2A_n71A DC_66A_n71A	CA_2A-66C	n71A
DC_2A-(n)71AA	DC_2A_n71A DC_(n)71AA	CA_2A-71A	n71A
DC_3A_n3A-n77A	DC_3A_n77A DC_3A_n3A(2)	3A	CA_n3A-n77A
DC_3A_n3A-n78A	DC_3A_n78A DC_3A_n3A(2)	3A	CA_n3A-n78A
DC_3A-5A_n78A	DC_3A_n78A DC_5A_n78A	CA_3A-5A	n78A
DC_3A-7A-7A_n78A	DC_3A_n78A DC_7A_n78A	CA_3A-7A-7A	n78A
DC_3A-7A_n28A	DC_3A_n28A DC_7A_n28A	CA_3A-7A	n28A
DC_3A-7A_n78A	DC_3A_n78A DC_7A_n78A	CA_3A-7A	n78A
DC_3A-7C_n78A	DC_3A_n78A DC_7C_n78A	CA_3A-7C	n78A

DC_3C-7C_n78A	DC_3A_n78A DC_7C_n78A	CA_3C-7C	n78A
DC_3C-7A_n78A	DC_3A_n78A DC_7A_n78A	CA_3C-7A	n78A
DC_3A-8A_n78A	DC_3A_n78A DC_8A_n78A	CA_3A-8A	n78A
DC_3A-19A_n77A DC_3A-19A_n77C	DC_3A_n77A DC_19A_n77A	CA_3A-19A	n77A CA_n77C
DC_3A-19A_n78A DC_3A-19A_n78C	DC_3A_n78A DC_19A_n78A	CA_3A-19A	n78A CA_n78C
DC_3A-19A_n79A DC_3A-19A_n79C	DC_3A_n79A DC_19A_n79A	CA_3A-19A	n79A CA_n79C
DC_3A-20A_n28A	DC_3A_n28A DC_20A_n28A	CA_3A-20A	n28A
DC_3A-20A_n78A	DC_3A_n78A DC_20A_n78A	CA_3A-20A	n78A
DC_3C-20A_n78A	DC_3A_n78A DC_20A_n78A	CA_3C-20A	n78A
DC_3A-21A_n77A DC_3A-21A_n77C	DC_3A_n77A DC_21A_n77A	CA_3A-21A	n77A CA_n77C
DC_3A-21A_n78A DC_3A-21A_n78C	DC_3A_n78A DC_21A_n78A	CA_3A-21A	n78A CA_n78C
DC_3A-21A_n79A DC_3A-21A_n79C	DC_3A_n79A DC_21A_n79A	CA_3A-21A	n79A CA_n79C
DC_3A-28A_n77A DC_3A-28A_n77C	DC_3A_n77A DC_28A_n77A	CA_3A-28A	n77A CA_n77C
DC_3A-28A_n78A DC_3A-28A_n78C	DC_3A_n78A DC_28A_n78A	CA_3A-28A	n78A CA_n78C
DC_3A-28A_n79A DC_3A-28A_n79C	DC_3A_n79A DC_28A_n79A	CA_3A-28A	n79A CA_n79C
DC_3A_n28A-n78A	DC_3A_n28A DC_3A_n78A	3A	CA_n28A-n78A
DC_3A-38A_n78A	DC_3A_n78A	CA_3A-38A	n78A
DC_3A-41A_n78A DC_3A-41C_n78A	DC_3A_n78A DC_41A_n78A DC_41C_n78A	CA_3A-41A CA_3A-41C	n78A
DC_3A-42A_n77A DC_3A-42A_n77C	DC_3A_n77A	CA_3A-42A	n77A CA_n77C
DC_3A-42A_n78A DC_3A-42A_n78C	DC_3A_n78A	CA_3A-42A	n78A CA_n78C
DC_3A-42A_n79A DC_3A-42A_n79C	DC_3A_n79A	CA_3A-42A	n79A CA_n79C
DC_3A-42C_n77A DC_3A-42C_n77C	DC_3A_n77A	CA_3A-42C	n77A CA_n77C
DC_3A-42C_n78A DC_3A-42C_n78C	DC_3A_n78A	CA_3A-42C	n78A CA_n78C
DC_3A-42C_n79A DC_3A-42C_n79C	DC_3A_n79A	CA_3A-42C	n79A CA_n79C
DC_3A-42D_n77A DC_3A-42D_n77C	DC_3A_n77A	CA_3A-42A	n77A CA_n77C
DC_3A-42D_n78A DC_3A-42D_n78C	DC_3A_n78A	CA_3A-42A	n78A CA_n78C
DC_3A-42D_n79A DC_3A-42D_n79C	DC_3A_n79A	CA_3A-42A	n79A CA_n79C
DC_3A-42E_n77A DC_3A-42E_n77C	DC_3A_n77A	CA_3A-42E	n77A CA_n77C
DC_3A-42E_n78A DC_3A-42E_n78C	DC_3A_n78A	CA_3A-42E	n78A CA_n78C
DC_3A-42E_n79A DC_3A-42_n77A	DC_3A_n79A	CA_3A -42E	n79A CA_n79C
DC_3A_n77A-n79A	DC_3A_n77A DC_3A_n79A	3A	CA_n77A-n79A
DC_3A_n78A-n79A	DC_3A_n78A DC_3A_n79A	3A	CA_n78A-n79A
DC_3A_SUL_n78A-n80A	DC_3A_n78A DC_3A_n80A_ULSUP-TDM_n78A DC_3A_n80A_ULSUP-FDM_n78A	3A	SUL_n78A -n80A

DC_3A_SUL_n78A-n82A	DC_3A_n78A DC_3A_n82A	3A	SUL_n78A-n82A
DC_3A_SUL_n79A-n80A	DC_3A_n79A, DC_3A_n80A_ULSUP-TDM_n79A, DC_3A_n80A_ULSUP-FDM_n79A	3A	SUL_n79A-n80A
DC_5A-7A-7A_n78A	DC_5A_n78A DC_7A_n78A	CA_5A-7A-7A	n78A
DC_5A-7A_n78A	DC_5A_n78A DC_7A_n78A	CA_5A-7A	n78A
DC_5A-30A_n66A	DC_5A_n66A DC_30A_n66A	CA_5A-30A	n66A
DC_7A-20A_n28A	DC_7A_n28A DC_20A_n28A	CA_7A-20A	n28A
DC_7A-20A_n78A	DC_7A_n78A DC_20A_n78A	CA_7A-20A	n78A
DC_7A-28A_n78A	DC_7A_n78A DC_28A_n78A	CA_7A-28A	n78A
DC_7A_n28A-n78A	DC_7A_n28A, DC_7A_n78A	7A	CA_n28A-n78A
DC_7C-28A_n78A	DC_7C_n78A DC_28A_n78A	CA_7C-28A	n78A
DC_7A-46A_n78A[3]	DC_7A_n78A	CA_7A-46A	n78A
DC_7A-46C_n78A[3]	DC_7A_n78A DC_46A _n78A	CA_7A-46C	n78A
DC_7A-46D_n78A[3]	DC_7A_n78A	CA_7A-46D	n78A
DC_7A-46E_n78A[3]	DC_7A_n78A	CA_7A-46E	n78 A
DC_8A_SUL_n78A-n81A	DC_8A_n78A, DC_8A_n81A_ULSUP-TDM_n78A, DC_8A_n81A_ULSUP-FDM_n78A	8A	SUL_n78A-n81A
DC_8A_SUL_n79A-n81A	DC_8A_n79A, DC_8A_n81A_ULSUP-TDM_n79A, DC_8A_n81A_ULSUP-FDM_n79A	8A	SUL_n79A-n81A
DC_12A-30A_n66A	DC_12A_n66A DC_30A_n66A	CA_12A-30A	n66A
DC_18A-28A_n77A	DC_18A_n77A DC_28A_n77A	CA_18A-28A	n77A
DC_18A-28A_n78A	DC_18A_n78A DC_28A_n78A	CA_18A-28A	n78A
DC_18A-28A_n79A	DC_18A_n79A DC_28A_n79A	CA_18A-28A	n79A
DC_19A-21A_n77A DC_19A-21A_n77C	DC_19A_n77A DC_21A_n77A	CA_19A-21A	n77A CA_n77C
DC_19A-21A_n78A DC_19A-21A_n78C	DC_19A_n78A DC_21A_n78A	CA_19A-21A	n78A CA_n78C
DC_19A-21A_n79A DC_19A-21A_n79C	DC_19A_n79A DC_21A_n79A	CA_19A-21A	n79A CA_n79C
DC_19A-42A_n77A DC_19A-42A_n77C	DC_19A_n77A	CA_19A-42A	n77A CA_n77C
DC_19A-42A_n78A DC_19A-42A_n78C	DC_19A_n78A	CA_19A-42A	n78A CA_n78C
DC_19A-42A_n79A DC_19A-42A_n79C	DC_19A_n79A	CA_19A-42A	n79A CA_n79C
DC_19A-42C_n77A DC_19A-42C_n77C	DC_19A_n77A	CA_19A-42C	n77A CA_n77C
DC_19A-42C_n78A DC_19A-42C_n78C	DC_19A_n78A	CA_19A-42C	n78A CA_n78C
DC_19A-42C_n79A DC_19A-42C_n79C	DC_19A_n79A	CA_19A-42C	n79A CA_n79C
DC_19A-42D_n77A DC_19A-42D_n77C	DC_19A_n77A	CA_19A-42D	n77A CA_n77C
DC_19A-42D_n78A DC_19A-42D_n78C	DC_19A_n78A	CA_19A-42D	n78A CA_n78C
DC_19A-42D_n79A DC_19A-42D_n79C	DC_19A_n79A	CA_19A-42D	n79A CA_n79C
DC_19A_n77A-n79A	DC_19A_n77A DC_19A_n79A	19A	CA_n77A-n79A

DC_19A_n78A-n79A	DC_19A_n78A DC_19A_n79A	19A	CA_n78A-n79A
DC_20A_n8A-n75A	DC_20A_n8A	20A	CA_n8A-n75A
DC_20A_n28A-n75A	DC_20A_n28A	20A	CA_n28A-n75A
DC_20A_n28A-n78A	DC_20A_n28A DC_20A_n78A	20A	CA_n28A-n78A
DC_20A_n75A-n78A	DC_20A_n78A	20A	CA_n75A-n78A
DC_20A_n76A-n78A	DC_20A_n78A	20A	CA_n76A-n78A
DC_20A_SUL_n78A-n82A	DC_20A_n78A, DC_20A_n82A_ULSUP-TDM_n78A, DC_20A_n82A_ULSUP-FDM_n78A	20A	SUL_n78A-n82A
DC_20A_SUL_n78A-n83A	DC_20A_n78A DC_20A_n83A	20A	SUL_n78A-n83A
DC_21A-28A_n77A DC_21A-28A_n77C	DC_21A_n77A DC_28A_n77A	CA_21A-28A	n77A CA_n77C
DC_21A-28A_n78A DC_21A-28A_n78C	DC_21A_n78A DC_28A_n78A	CA_21A-28A	n78A CA_n78C
DC_21A-28A_n79A DC_21A-28A_n79C	DC_21A_n79A DC_28A_n79A	CA_21A-28A	n79A CA_n79C
DC_21A-42A_n77A DC_21A-42A_n77C	DC_21A_n77A	CA_21A-42A	n77A CA_n77C
DC_21A-42A_n78A DC_21A-42A_n78C	DC_21A_n78A	CA_21A-42A	n78A CA_n78C
DC_21A-42A_n79A DC_21A-42A_n79C	DC_21A_n79A	CA_21A-42A	n79A CA_n79C
DC_21A-42C_n77A DC_21A-42C_n77C	DC_21A_n77A	CA_21A-42C	n77A CA_n77C
DC_21A-42C_n78A DC_21A-42C_n78C	DC_21A_n78A	CA_21A-42C	n78A CA_n78C
DC_21A-42C_n79A DC_21A-42C_n79C	DC_21A_n79A	CA_21A-42C	n79A CA_n79C
DC_21A-42D_n77A DC_21A-42D_n77C	DC_21A_n77A	CA_21A-42D	n77A CA_n77C
DC_21A-42D_n78A DC_21A-42D_n78C	DC_21A_n78A	CA_21A-42D	n78A CA_n78C
DC_21A-42D_n79A DC_21A-42D_n79C	DC_21A_n79A	CA_21A-42D	n79A CA_n79C
DC_21A-42E_n77A DC_21A-42E_n77C	DC_21A_n77A	CA_21A-42E	n77A CA_n77C
DC_21A-42E_n78A DC_21A-42E_n78C	DC_21A_n78A	CA_21A-42E	n78A CA_n78C
DC_21A-42E_n79A DC_21A-42E_n79C	DC_21A_n79A	CA_21A-42E	n79A CA_n79C
DC_21A_n77A-n79A	DC_21A_n77A DC_21A_n79A	21A	CA_n77A-n79A
DC_21A_n78A-n79A	DC_21A_n78A DC_21A_n79A	21A	CA_n78A-n79A
DC_28A_SUL_n78A-n83A	DC_28A_n78A, DC_28A_n83A_ULSUP-TDM_n78A, DC_28A_n83A_ULSUP-FDM_n78A	28A	SUL_n78A-n83A
DC_28A-42A_n77A DC_28A-42A_n77C	DC_28A_n77A	CA_28A-42A	n77A CA_n77C
DC_28A-42A_n78A DC_28A-42A_n78C	DC_28A_n78A	CA_28A-42A	n78A CA_n78C
DC_28A-42A_n79A DC_28A-42A_n79C	DC_28A_n79A	CA_28A-42A	n79A CA_n79C
DC_28A-42C_n77A	DC_28A_n77A	CA_28A-42C	n77A
DC_28A-42C_n78A	DC_28A_n78A	CA_28A-42C	n78A
DC_28A-42C_n79A	DC_28A_n79A	CA_28A-42C	n79A
DC_41A-42A_n77A	DC_41A_n77A	CA_41A-42A	n77A
DC_41A-42C_n77A	DC_41A_n77A	CA_41A-42C	n77A
DC_41C-42A_n77A	DC_41C_n77A	CA_41C-42A	n77A
DC_41C-42C_n77A	DC_41A_n77A	CA_41C-42C	n77A
DC_41A-42A_n78A	DC_41A_n78A	CA_41A-42A	n78A
DC_41A-42C_n78A	DC_41A_n78A	CA_41A-42C	n78A
DC_41C-42A_n78A	DC_41C_n78A	CA_41C-42A	n78A
DC_41C-42C_n78A	DC_41A_n78A	CA_41C-42C	n78A

DC_41A-42A_n79A DC_41A-42C_n79A	DC_41A_n79A	CA_41A-42A CA_41A-42C	n79A
DC_41C-42A_n79A	DC_41C_n79A	CA_41C-42A	n79A
DC_41C-42C_n79A	DC_41A_n79A	CA_41C-42C	n79A
DC_66A_(n)71AA	DC_66A_ n 71A DC_(n)71AA	CA_66A_71A	n71A
DC_66C-(n)71AA	DC_66A_n71A DC_(n)71AA	CA_66C-71A	n71A
DC_66A_SUL_n78A-n86A	DC_66A_n78A, DC_66A_n86A_ULSUP-TDM_n78A, DC_66A_n86A_ULSUP-FDM_n78A	66A	SUL_n78A-n86A
NOTE 1: Uplink CA configurations are the configurations supported by the present release of specifications. NOTE 2: Only single switched UL is supported in Rel.15.			

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)	E-UTRA configuration	NR configuration
DC_1A-3A-5A_n78A	DC_1A_n78A DC_3A_n78A DC_5A_n78A	CA_1A-3A-5A	n78A
DC_1A-3A-7A_n28A	DC_1A_n28A DC_3A_n28A DC_7A_n28A	CA_1A-3A-7A	n28A
DC_1A-3A-7A_n78A	DC_1A_n78A DC_3A_n78A DC_7A_n78A	CA_1A-3A-7A	n78A
DC_1A-3C-7A_n78A	DC_1A_n78A DC_3A_n78A DC_7A_n78A	CA_1A-3C-7A	n78A
DC_1A-3A-7A-7A_n78A	DC_1A_n78A DC_3A_n78A DC_7A_n78A	CA_1A-3A-7A-7A	n78A
DC_1A-3A-8A_n78A	DC_1A_n78A DC_3A_n78A DC_8A_n78A	CA_1A-3A-8A	n78A
DC_1A-3A-19A_n77A	DC_1A_n77A DC_3A_n77A DC_19A_n77A	CA_1A-3A-19A	n77A
DC_1A-3A-19A_n78A	DC_1A_n78A DC_3A_n78A DC_19A_n78A	CA_1A-3A-19A	n78A
DC_1A-3A-19A_n79A	DC_1A_n79A DC_3A_n79A DC_19A_n79A	CA_1A-3A-19A	n79A
DC_1A-3A-20A_n28A	DC_1A_n28A DC_3A_n28A DC_20A_n28A	CA_1A-3A-20A	n28A
DC_1A-3A-20A_n78A	DC_1A_n78A DC_3A_n78A DC_20A_n78A	CA_1A-3A-20A	n78A
DC_1A-3A-21A_n77A	DC_1A_n77A DC_3A_n77A DC_21A_n77A	CA_1A-3A-21A	n77A
DC_1A-3A-21A_n78A	DC_1A_n78A DC_3A_n78A DC_21A_n78A	CA_1A-3A-21A	n78A
DC_1A-3A-21A_n79A	DC_1A_n79A DC_3A_n79A DC_21A_n79A	CA_1A-3A-21A	n79A
DC_1A-3A-28A_n77A	DC_1A_n77A DC_3A_n77A DC_28A_n77A	CA_1A-3A-28A	n77A
DC_1A-3A-28A_n78A	DC_1A_n78A DC_3A_n78A DC_28A_n78A	CA_1A-3A-28A	n78A
DC_1A-3A-28A_n79A	DC_1A_n79A DC_3A_n79A DC_28A_n79A	CA_1A-3A-28A	n79A
DC_1A-3A_n28A-n78A	DC_1A_n28A DC_1A_n78A DC_3A_n28A DC_3A_n78A	CA_1A-3A	CA_n28A-n78A
DC_1A-3A-42A_n77A DC_1A-3A-42A_n77C	DC_1A_n77A DC_3A_n77A	CA_1A-3A-42A	n77A CA_n77C
DC_1A-3A-42A_n78A DC_1A-3A-42A_n78C	DC_1A_n78A DC_3A_n78A	CA_1A-3A-42A	n78A CA_n78C
DC_1A-3A-42A_n79A DC_1A-3A-42A_n79C	DC_1A_n79A DC_3A_n79A	CA_1A-3A-42A	n79A CA_n79C
DC_1A-3A-42C_n77A	DC_1A_n77A DC_3A_n77A	CA_1A-3A-42C	n77A

DC_1A-3A-42C_n78A	DC_1A_n78A DC_3A_n78A	CA_1A-3A-42C	n78A
DC_1A-3A-42C_n79A	DC_1A_n79A DC_3A_n79A	CA_1A-3A-42C	n79A
DC_1A-3A-42C_n77C	DC_1A_n77A DC_3A_n77A	CA_1A-3A-42C	CA_n77C
DC_1A-3A-42C_n78C	DC_1A_n78A DC_3A_n78A	CA_1A-3A-42C	CA_n78C
DC_1A-3A-42C_n79C	DC_1A_n79A DC_3A_n79A	CA_1A-3A-42C	CA_n79C
DC_1A-5A-7A_n78A	DC_1A_n78A DC_5A_n78A DC_7A_n78A	CA_1A-5A-7A	n78A
DC_1A-5A-7A-7A_n78A	DC_1A_n78A DC_5A_n78A DC_7A_n78A	CA_1A-5A-7A-7A	n78A
DC_1A-7A-20A_n28A	DC_1A_n28A DC_7A_n28A DC_20A_n28A	CA_1A-7A-20A	n28A
DC_1A-7A-20A_n78A	DC_1A_n78A DC_7A_n78A DC_20A_n78A	CA_1A-7A-20A	n78A
DC_1A-7A_n28A-n78A	DC_1A_n28A DC_1A_n78A DC_7A_n28A DC_7A_n78A	CA_1A-7A	CA_n28A-n78A
DC_1A-18A-28A_n77A	DC_1A_n77A DC_18A_n77A DC_28A_n77A	CA_1A-18A-28A	n77A
DC_1A-18A-28A_n78A	DC_1A_n78A DC_18A_n78A DC_28A_n78A	CA_1A-18A-28A	n78A
DC_1A-18A-28A_n79A	DC_1A_n79A DC_18A_n79A DC_28A_n79A	CA_1A-18A-28A	n79A
DC_1A-19A-21A_n77A DC_1A-19A-21A_n77C	DC_1A_n77A DC_19A_n77A DC_21A_n77A	CA_1A-19A-21A	CA_n77A CA_n77C
DC_1A-19A-21A_n78A DC_1A-19A-21A_n78C	DC_1A_n78A DC_19A_n78A DC_21A_n78A	CA_1A-19A-21A	CA_n78A CA_n78C
DC_1A-19A-21A_n79A DC_1A-19A-21A_n79C	DC_1A_n79A DC_19A_n79A DC_21A_n79A	CA_1A-19A-21A	CA_n79A CA_n79C
DC_1A-19A-42A_n77A DC_1A-19A-42A_n77C	DC_1A_n77A DC_19A_n77A	CA_1A-19A-42A	n77A CA_n77C
DC_1A-19A-42A_n78A DC_1A-19A-42A_n78C	DC_1A_n78A DC_19A_n78A	CA_1A-19A-42A	n78A CA_n78C
DC_1A-19A-42A_n79A DC_1A-19A-42A_n79C	DC_1A_n79A DC_19A_n79A	CA_1A-19A-42A	n79A CA_n79C
DC_1A-19A-42C_n77A	DC_1A_n77A DC_19A_n77A	CA_1A-19A-42C	n77A
DC_1A-19A-42C_n78A	DC_1A_n78A DC_19A_n78A	CA_1A-19A-42C	n78A
DC_1A-19A-42C_n79A	DC_1A_n79A DC_19A_n79A	CA_1A-19A-42C	n79A
DC_1A-19A-42C_n77C	DC_1A_n77A DC_19A_n77A	CA_1A-19A-42C	CA_n77C
DC_1A-19A-42C_n78C	DC_1A_n78A DC_19A_n78A	CA_1A-19A-42C	CA_n78C
DC_1A-19A-42C_n79C	DC_1A_n79A DC_19A_n79A	CA_1A-19A-42C	CA_n79C
DC_1A-20A_n28A-n78A	DC_1A_n28A DC_1A_n78A DC_20A_n28A DC_20A_n78A	CA_1A-20A	CA_n28A-n78A

DC_1A-21A-28A_n77A	DC_1A_n77A DC_21A_n77A DC_28A_n77A	CA_1A-21A-28A	n77A
DC_1A-21A-28A_n78A	DC_1A_n78A DC_21A_n78A DC_28A_n78A	CA_1A-21A-28A	n78A
DC_1A-21A-28A_n79A	DC_1A_n79A DC_21A_n79A DC_28A_n79A	CA_1A-21A-28A	n79A
DC_1A-21A-42A_n77A DC_1A-21A-42A_n77C	DC_1A_n77A DC_21A_n77A	CA_1A-21A-42A	n77A CA_n77C
DC_1A-21A-42A_n78A DC_1A-21A-42A_n78C	DC_1A_n78A DC_21A_n78A	CA_1A-21A-42A	n78A CA_n78C
DC_1A-21A-42A_n79A DC_1A-21A-42A_n79C	DC_1A_n79A DC_21A_n79A	CA_1A-21A-42A	n79A CA_n79C
DC_1A-21A-42C_n77A	DC_1A_n77A DC_21A_n77A	CA_1A-21A-42C	CA_n77C
DC_1A-21A-42C_n78A	DC_1A_n78A DC_21A_n78A	CA_1A-21A-42C	CA_n78C
DC_1A-21A-42C_n79A	DC_1A_n79A DC_21A_n79A	CA_1A-21A-42C	CA_n79C
DC_1A-21A-42C_n77C	DC_1A_n77A DC_21A_n77A	CA_1A-21A-42C	CA_n77C
DC_1A-21A-42C_n78C	DC_1A_n78A DC_21A_n78A	CA_1A-21A-42C	CA_n78C
DC_1A-21A-42C_n79C	DC_1A_n79A DC_21A_n79A	CA_1A-21A-42C	CA_n79C
DC_1A-21A-42D_n77A	DC_1A_n77A DC_21A_n77A	CA_1A-21A-42D	n77A
DC_1A-21A-42D_n78A	DC_1A_n78A DC_21A_n78A	CA_1A-21A-42D	n78A
DC_1A-21A-42D_n79A	DC_1A_n79A DC_21A_n79A	CA_1A-21A-42D	n79A
DC_1A-21A-42D_n77C	DC_1A_n77A DC_21A_n77A	CA_1A-21A-42D	CA_n77C
DC_1A-21A-42D_n78C	DC_1A_n78A DC_21A_n78A	CA_1A-21A-42D	CA_n78C
DC_1A-21A-42D_n79C	DC_1A_n79A DC_21A_n79A	CA_1A-21A-42D	CA_n79C
DC_1A-28A-42A_n77A	DC_1A_n77A DC_28A_n77A	CA_1A-28A-42A	n77A
DC_1A-28A-42A_n78A	DC_1A_n78A DC_28A_n78A	CA_1A-28A-42A	n78A
DC_1A-28A-42A_n79A	DC_1A_n79A DC_28A_n79A	CA_1A-28A-42A	n79A
DC_1A-28A-42C_n77A	DC_1A_n77A DC_28A_n77A	CA_1A-28A-42A	n77A
DC_1A-28A-42C_n78A	DC_1A_n78A DC_28A_n78A	CA_1A-28A-42A	n78A
DC_1A-28A-42C_n79A	DC_1A_n79A DC_28A_n79A	CA_1A-28A-42A	n79A
DC_1A-41A-42A_n77A	DC_1A_n77A DC_41A_n77A	CA_1A-41A-42A	n77A
DC_1A-41A-42C_n77A	DC_1A_n77A DC_41A_n77A	CA_1A-41A-42C	n77A
DC_1A-41C-42A_n77A	DC_1A_n77A DC_41A_n77A	CA_1A-41C-42A	n77A
DC_1A-41A-42A_n78A	DC_1A_n78A DC_41A_n78A	CA_1A-41A-42A	n78A
DC_1A-41A-42C_n78A	DC_1A_n78A DC_41A_n78A	CA_1A-41A-42C	n78A
DC_1A-41C-42A_n78A	DC_1A_n78A DC_41A_n78A	CA_1A-41C-42A	n78A
DC_1A-41A-42A_n79A	DC_1A_n79A DC_41A_n79A	CA_1A-41A-42A	n79A
DC_1A-41A-42C_n79A	DC_1A_n79A DC_41A_n79A	CA_1A-41A-42C	n79A

DC_1A-41C-42A_n79A	DC_1A_n79A DC_41A_n79A	CA_1A-41C-42A	n79A
DC_1A-41C-42C_n77A	DC_1A_n77A DC_41A_n77A	CA_1A-41C-42C	n77A
DC_1A-41C-42C_n78A	DC_1A_n78A DC_41A_n78A	CA_1A-41C-42C	n78A
DC_1A-41C-42C_n79A	DC_1A_n79A DC_41A_n79A	CA_1A-41C-42C	n79A
DC_2A-66A_(n)71AA	DC_2A_n71A DC_66A_n71A DC_(n)71AA	CA_2A-66A-71A	n71A
DC_2A-66C-(n)71AA	DC_(n)71AA DC_66A_n71A DC_2A_n71A	CA_2A-66C-71A	n71A
DC_3A-5A-7A-7A_n78A	DC_3A_n78A DC_5A_n78A DC_7A_n78A	CA_3A-5A-7A-7A	n78A
DC_3A-5A-7A_n78A	DC_3A_n78A DC_5A_n78A DC_7A_n78A	CA_3A-5A-7A	n78A
DC_3A-7A-20A_n28A	DC_3A_n28A DC_7A_n28A DC_20A_n28A	CA_3A-7A-20A	n28A
DC_3A-7A-20A_n78A	DC_3A_n78A DC_20A_n78A DC_7A_n78A	CA_3A-7A-20A	n78A
DC_3A-7A-28A_n78A	DC_3A-7A_n78A DC_3A-28A_n78A DC_7A-28A_n78A	CA_3A-7A-28A	n78A
DC_3A-7C-28A_n78A	DC_3A_n78A DC_7A_n78A DC_28A_n78A	CA_3A-7C-28A	n78A
DC_3A-7A_n28A-n78A	DC_3A_n28A DC_3A_n78A DC_7A_n28A DC_7A_n78A	CA_3A-7A	CA_n28A-n78A
DC_3A-19A-21A_n77A DC_3A-19A-21A_n77C	DC_3A_n77A DC_19A_n77A DC_21A_n77A	CA_3A-19A-21A	n77A CA_n77C
DC_3A-19A-21A_n78A DC_3A-19A-21A_n78C	DC_3A_n78A DC_19A_n78A DC_21A_n78A	CA_3A-19A-21A	n78A CA_n78C
DC_3A-19A-21A_n79A DC_3A-19A-21A_n79C	DC_3A_n79A DC_19A_n79A DC_21A_n79A	CA_3A-19A-21A	n79A CA_n79C
DC_3A-19A-42A_n77A DC_3A-19A-42A_n77C	DC_3A_n77A DC_19A_n77A	CA_3A-19A-42A	n77A CA_n77C
DC_3A-19A-42C_n77A DC_3A-19A-42C_n77C	DC_3A_n77A DC_19A_n77A	CA_3A-19A-42C	n77A CA_n77C
DC_3A-19A-42A_n78A DC_3A-19A-42A_n78C	DC_3A_n78A DC_19A_n78A	CA_3A-19A-42A	n78A CA_n78C
DC_3A-19A-42C_n78A DC_3A-19A-42C_n78C	DC_3A_n78A DC_19A_n78A	CA_3A-19A-42C	n78A CA_n78C
DC_3A-19A-42A_n79A DC_3A-19A-42A_n79C	DC_3A_n79A DC_19A_n79A	CA_3A-19A-42A	n79A CA_n79C
DC_3A-19A-42C_n79A DC_3A-19A-42C_n79C	DC_3A_n79A DC_19A_n79A	CA_3A-19A-42C	n79A CA_n79C
DC_3A-19A-42D_n77A	DC_3A_n77A DC_19A_n77A	CA_3A-19A-42D	n77A
DC_3A-19A-42D_n78A	DC_3A_n78A DC_19A_n78A	CA_3A-19A-42D	n78A
DC_3A-19A-42D_n79A	DC_3A_n79A DC_19A_n79A	CA_3A-19A-42D	n79A
DC_3A-19A-42D_n77C	DC_3A_n77A DC_19A_n77A	CA_3A-19A-42D	CA_n77C
DC_3A-19A-42D_n78C	DC_3A_n78A DC_19A_n78A	CA_3A-19A-42D	CA_n78C

DC_3A-19A-42D_n79C	DC_3A_n79A DC_19A_n79A	CA_3A-19A-42D	CA_n79C
DC_3A-20A_n28A-n78A	DC_3A_n28A DC_3A_n78A DC_20A_n28A DC_20A_n78A	CA_3A-20A	CA_n28A-n78A
DC_3A-21A-42A_n77A DC_3A-21A-42A_n77C	DC_3A_n77A DC_21A_n77A	CA_3A-21A-42A	n77A CA_n77C
DC_3A-21A-42A_n78A DC_3A-21A-42A_n78C	DC_3A_n78A DC_21A_n78A	CA_3A-21A-42A	n78A CA_n78C
DC_3A-21A-42A_n79A DC_3A-21A-42A_n79C	DC_3A_n79A DC_21A_n79A	CA_3A-21A-42A	n79A CA_n79C
DC_3A-21A-42C_n77A	DC_3A_n77A DC_21A_n77A	CA_3A-21A-42C	n77A
DC_3A-21A-42C_n78A	DC_3A_n78A DC_21A_n78A	CA_3A-21A-42C	n78A
DC_3A-21A-42C_n79A	DC_3A_n79A DC_21A_n79A	CA_3A-21A-42C	n79A
DC_3A-21A-42C_n77C	DC_3A_n77A DC_21A_n77A	CA_3A-21A-42C	CA_n77C
DC_3A-21A-42C_n78C	DC_3A_n78A DC_21A_n78A	CA_3A-21A-42C	CA_n78C
DC_3A-21A-42C_n79C	DC_3A_n79A DC_21A_n79A	CA_3A-21A-42C	CA_n79C
DC_3A-21A-42D_n77A	DC_3A_n77A DC_21A_n77A	CA_3A-21A-42D	n77A
DC_3A-21A-42D_n78A	DC_3A_n78A DC_21A_n78A	CA_3A-21A-42D	n78A
DC_3A-21A-42D_n79A	DC_3A_n79A DC_21A_n79A	CA_3A-21A-42D	n79A
DC_3A-21A-42D_n77C	DC_3A_n77A DC_21A_n77A	CA_3A-21A-42D	CA_n77C
DC_3A-21A-42D_n78C	DC_3A_n78A DC_21A_n78A	CA_3A-21A-42D	CA_n78C
DC_3A-21A-42D_n79C	DC_3A_n79A DC_21A_n79A	CA_3A-21A-42D	CA_n79C
DC_3A-28A-42A_n77A	DC_3A_n77A DC_28A_n77A	CA_3A-28A-42A	n77A
DC_3A-28A-42A_n78A	DC_3A_n78A DC_28A_n78A	CA_3A-28A-42A	n78A
DC_3A-28A-42A_n79A	DC_3A_n79A DC_28A_n79A	CA_3A-28A-42A	n79A
DC_3A-28A-42C_n77A	DC_3A_n77A DC_28A_n77A	CA_3A-28A-42C	n77A
DC_3A-28A-42C_n78A	DC_3A_n78A DC_28A_n78A	CA_3A-28A-42C	n78A
DC_3A-28A-42C_n79A	DC_3A_n79A DC_28A_n79A	CA_3A-28A-42C	n79A
DC_7A-20A_n28A-n78A	DC_7A_n28A DC_7A_n78A DC_20A_n28A DC_20A_n78A	CA_7A-20A	CA_n28A-n78A
DC_19A-21A-42A_n77A DC_19A-21A-42A_n77C	DC_19A_n77A DC_21A_n77A	CA_19A-21A-42A	n77A CA_n77C
DC_19A-21A-42A_n78A DC_19A-21A-42A_n78C	DC_19A_n78A DC_21A_n78A	CA_19A-21A-42A	n78A CA_n78C
DC_19A-21A-42A_n79A DC_19A-21A-42A_n79C	DC_19A_n79A DC_21A_n79A	CA_19A-21A-42A	n79A CA_n79C
DC_19A-21A-42C_n77A	DC_19A_n77A DC_21A_n77A	CA_19A-21A-42C	n77A
DC_19A-21A-42C_n78A	DC_19A_n78A DC_21A_n78A	CA_19A-21A-42C	n78A
DC_19A-21A-42C_n79A	DC_19A_n79A DC_21A_n79A	CA_19A-21A-42C	n79A
DC_19A-21A-42C_n77C	DC_19A_n77A DC_21A_n77A	CA_19A-21A-42C	CA_n77C

DC_19A-21A-42C_n78C	DC_19A_n78A DC_21A_n78A	CA_19A-21A-42C	CA_n78C
DC_19A-21A-42C_n79C	DC_19A_n79A DC_21A_n79A	CA_19A-21A-42C	CA_n79C
DC_21A-28A-42A_n77A	DC_21A_n77A DC_28A_n77A	CA_21A-28A-42A	n77A
DC_21A-28A-42A_n78A	DC_21A_n78A DC_28A_n78A	CA_21A-28A-42A	n78A
DC_21A-28A-42A_n79A	DC_21A_n79A DC_28A_n79A	CA_21A-28A-42A	n79A
DC_21A-28A-42C_n77A	DC_21A_n77A DC_28A_n77A	CA_21A-28A-42C	n77A
DC_21A-28A-42C_n78A	DC_21A_n78A DC_28A_n78A	CA_21A-28A-42C	n78A
DC_21A-28A-42C_n79A	DC_21A_n79A DC_28A_n79A	CA_21A-28A-42C	n79A
NOTE 1: Uplink CA configurations are the configurations supported by the present release of specifications.			

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)	E-UTRA configuration	NR configuration
DC_1A-3A-5A-7A_n78A	DC_1A_n78A DC_3A_n78A DC_5A_n78A DC_7A_n78A	CA_1A-3A-5A-7A	n78A
DC_1A-3A-5A-7A-7A_n78A	DC_1A_n78A DC_3A_n78A DC_5A_n78A DC_7A_n78A	CA_1A-3A-5A-7A-7A	n78A
DC_1A-3A-7A-20A_n28A	DC_1A_n28A DC_3A_n28A DC_7A_n28A DC_20A_n28A	CA_1A-3A-7A-20A	n28A
DC_1A-3A-7A-20A_n78A	DC_1A_n78A DC_3A_n78A DC_7A_n78A DC_20A_n78A	CA_1A-3A-7A-20A	n78A
DC_1A-3A-7A_n28A_n78A	DC_1A_n28A DC_1A_n78A DC_3A_n28A DC_3A_n78A DC_7A_n28A DC_7A_n78A	CA_1A-3A-7A	CA_n28A-n78A
DC_1A-3A-19A-21A_n77A	DC_1A_n77A DC_3A_n77A DC_19A_n77A DC_21A_n77A	CA_1A-3A-19A-21A	n77A
DC_1A-3A-19A-21A_n77C	DC_1A_n77A DC_3A_n77A DC_19A_n77A DC_21A_n77A	CA_1A-3A-19A-21A	CA_n77C
DC_1A-3A-19A-21A_n78A	DC_1A_n78A DC_3A_n78A DC_19A_n78A DC_21A_n78A	CA_1A-3A-19A-21A	n78A
DC_1A-3A-19A-21A_n78C	DC_1A_n78A DC_3A_n78A DC_19A_n78A DC_21A_n78A	CA_1A-3A-19A-21A	CA_n78C
DC_1A-3A-19A-21A_n79A	DC_1A_n79A DC_3A_n79A DC_19A_n79A DC_21A_n79A	CA_1A-3A-19A-21A	n79A
DC_1A-3A-19A-21A_n79C	DC_1A_n79A DC_3A_n79A DC_19A_n79A DC_21A_n79A	CA_1A-3A-19A-21A	CA_n79C
DC_1A-3A-19A-42A_n77A	DC_1A_n77A DC_3A_n77A DC_19A_n77A	CA_1A-3A-19A-42A	n77A
DC_1A-3A-19A-42A_n77C	DC_1A_n77A DC_3A_n77A DC_19A_n77A	CA_1A-3A-19A-42A	n77C
DC_1A-3A-19A-42C_n77A	DC_1A_n77A DC_3A_n77A DC_19A_n77A	CA_1A-3A-19A-42C	n77A
DC_1A-3A-19A-42C_n77C	DC_1A_n77A DC_3A_n77A DC_19A_n77A	CA_1A-3A-19A-42C	CA_n77C
DC_1A-3A-19A-42A_n78A	DC_1A_n78A DC_3A_n78A DC_19A_n78A	CA_1A-3A-19A-42A	n78A
DC_1A-3A-19A-42A_n78C	DC_1A_n78A DC_3A_n78A DC_19A_n78	CA_1A-3A-19A-42A	CA_n78C

DC_1A-3A-19A-42C_n78A	DC_1A_n78A DC_3A_n78A DC_19A_n78A	CA_1A-3A-19A-42C	n78A
DC_1A-3A-19A-42C_n78C	DC_1A_n78A DC_3A_n78A DC_19A_n78A	CA_1A-3A-19A-42C	CA_n78C
DC_1A-3A-19A-42A_n79A	DC_1A_n79A DC_3A_n79A DC_19A_n79A	CA_1A-3A-19A-42A	n79A
DC_1A-3A-19A-42A_n79C	DC_1A_n79A DC_3A_n79A DC_19A_n79A	CA_1A-3A-19A-42A	CA_n79C
DC_1A-3A-19A-42C_n79A	DC_1A_n79A DC_3A_n79A DC_19A_n79A	CA_1A-3A-19A-42C	n79A
DC_1A-3A-19A-42C_n79C	DC_1A_n79A DC_3A_n79A DC_19A_n79A	CA_1A-3A-19A-42C	CA_n79C
DC_1A-3A-20A_n28A-n78A	DC_1A_n28A DC_1A_n78A DC_3A_n28A DC_3A_n78A DC_20A_n28A DC_20A_n78A	CA_1A-3A-20A	CA_n28A-n78A
DC_1A-3A-21A-42A_n77A DC_1A-3A-21A-42A_n77C	DC_1A_n77A DC_3A_n77A DC_21A_n77A	CA_1A-3A-21A-42A	n77A CA_n77C
DC_1A-3A-21A-42A_n78A DC_1A-3A-21A-42A_n78C	DC_1A_n78A DC_3A_n78A DC_21A_n78A	CA_1A-3A-21A-42A	n78A CA_n78C
DC_1A-3A-21A-42A_n78A DC_1A-3A-21A-42A_n78C	DC_1A_n78A DC_3A_n78A DC_21A_n78A	CA_1A-3A-21A-42A	n79A CA_n79C
DC_1A-3A-21A-42C_n77A	DC_1A_n77A DC_3A_n77A DC_21A_n77A	CA_1A-3A-21A-42C	n77A
DC_1A-3A-21A-42C_n77C	DC_1A_n77A DC_3A_n77A DC_21A_n77A	CA_1A-3A-21A-42C	CA_n77C
DC_1A-3A-21A-42C_n78A	DC_1A_n78A DC_3A_n78A DC_21A_n78A	CA_1A-3A-21A-42C	n78A
DC_1A-3A-21A-42C_n78C	DC_1A_n78A DC_3A_n78A DC_21A_n78A	CA_1A-3A-21A-42C	CA_n78C
DC_1A-3A-21A-42C_n79A	DC_1A_n79A DC_3A_n79A DC_21A_n79A	CA_1A-3A-21A-42C	n79A
DC_1A-3A-21A-42C_n79C	DC_1A_n79A DC_3A_n79A DC_21A_n79A	CA_1A-3A-21A-42C	CA_n79C
DC_1A-3A-28A-42A_n77A	DC_1A_n77A DC_3A_n77A DC_28A_n77A	CA_1A-3A-28A-42A	n77A
DC_1A-3A-28A-42A_n78A	DC_1A_n78A DC_3A_n78A DC_28A_n78A	CA_1A-3A-28A-42A	n78A
DC_1A-3A-28A-42A_n79A	DC_1A_n79A DC_3A_n79A DC_28A_n79A	CA_1A-3A-28A-42A	n79A
DC_1A-3A-28A-42C_n77A	DC_1A_n77A DC_3A_n77A DC_28A_n77A	CA_1A-3A-28A-42C	n77A
DC_1A-3A-28A-42C_n78A	DC_1A_n78A DC_3A_n78A DC_28A_n78A	CA_1A-3A-28A-42C	n78A

DC_1A-3A-28A-42C_n79A	DC_1A_n79A DC_3A_n79A DC_28A_n79A	CA_1A-3A-28A-42C	n79A
DC_1A-7A-20A_n28A-n78A	DC_1A_n28A DC_1A_n78A DC_7A_n28A DC_7A_n78A DC_20A_n28A DC_20A_n78A	CA_1A-7A-20A	CA_n28A-n78A
DC_1A-19A-21A-42A_n77A	DC_1A_n77A DC_19A_n77A DC_21A_n77A	CA_1A-19A-21A-42A	n77A
DC_1A-19A-21A-42A_n78A	DC_1A_n78A DC_19A_n78A DC_21A_n78A	CA_1A-19A-21A-42A	n78A
DC_1A-19A-21A-42A_n79A	DC_1A_n79A DC_19A_n79A DC_21A_n79A	CA_1A-19A-21A-42A	n79A
DC_1A-19A-21A-42A_n77C	DC_1A_n77A DC_19A_n77A DC_21A_n77A	CA_1A-19A-21A-42A	CA_n77C
DC_1A-19A-21A-42A_n78C	DC_1A_n78A DC_19A_n78A DC_21A_n78A	CA_1A-19A-21A-42A	CA_n78C
DC_1A-19A-21A-42A_n79C	DC_1A_n79A DC_19A_n79A DC_21A_n79A	CA_1A-19A-21A-42A	CA_n79C
DC_1A-19A-21A-42C_n77A	DC_1A_n77A DC_19A_n77A DC_21A_n77A	CA_1A-19A-21A-42C	n77A
DC_1A-19A-21A-42C_n77C	DC_1A_n77A DC_19A_n77A DC_21A_n77A	CA_1A-19A-21A-42C	CA_n77C
DC_1A-19A-21A-42C_n78A	DC_1A_n78A DC_19A_n78A DC_21A_n78A	CA_1A-19A-21A-42C	n78A
DC_1A-19A-21A-42C_n78C	DC_1A_n78A DC_19A_n78A DC_21A_n78A	CA_1A-19A-21A-42C	CA_n78C
DC_1A-19A-21A-42C_n79A	DC_1A_n79A DC_19A_n79A DC_21A_n79A	CA_1A-19A-21A-42C	n79A
DC_1A-19A-21A-42C_n79C	DC_1A_n79A DC_19A_n79A DC_21A_n79A	CA_1A-19A-21A-42C	CA_n79C
DC_1A-21A-28A-42A_n77A	DC_1A_n77A DC_21A_n77A DC_28A_n77A	CA_1A-21A-28A-42A	n77A
DC_1A-21A-28A-42A_n78A	DC_1A_n78A DC_21A_n78A DC_28A_n78A	CA_1A-21A-28A-42A	n78A
DC_1A-21A-28A-42A_n79A	DC_1A_n79A DC_21A_n79A DC_28A_n79A	CA_1A-21A-28A-42A	n79A
DC_1A-21A-28A-42C_n77A	DC_1A_n77A DC_21A_n77A DC_28A_n77A	CA_1A-21A-28A-42C	n77A
DC_1A-21A-28A-42C_n78A	DC_1A_n78A DC_21A_n78A DC_28A_n78A	CA_1A-21A-28A-42C	n78A
DC_1A-21A-28A-42C_n79A	DC_1A_n79A DC_21A_n79A DC_28A_n79A	CA_1A-21A-28A-42C	n79A

DC_3A-7A-20A_n28A-n78A	DC_3A_n28A DC_3A_n78A DC_7A_n28A DC_7A_n78A DC_20A_n28A DC_20A_n78A	CA_3A-7A-20A	CA_n28A-n78A
NOTE 1: Uplink CA configurations are the configurations supported by the present release of specifications.			

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)	E-UTRA configuration	NR configuration
DC_1A-3A-7A-20A_n28A-n78A	DC_1A_n28A DC_1A_n78A DC_3A_n28A DC_3A_n78A DC_7A_n28A DC_7A_n78A DC_20A_n28A DC_20A_n78A	CA_1A-3A-7A-20A	CA_n28A-n78A
NOTE 1: Uplink CA configurations are the configurations supported by the present release of specifications.			

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

Supported channel bandwidths for E-UTRA operating bands and CA configurations are defined in TS 36.521-1 [10] and for NR operating bands and CA configurations in TS 38.521-1 [8], TS 38.521-2 [9] and present document.

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)	E-UTRA configuration	NR configuration
DC_1A_n257A DC_1A_n257D DC_1A_n257E DC_1A_n257F	DC_1A_n257A	1A	n257A CA_n257D CA_n257E CA_n257F
DC_2A_n257A DC_2A_n257(2A)	DC_2A_n257A	2A	n257A CA_n257(2A)
DC_2A-2A_n257A	DC_2A_n257A	CA_2A-2A	n257A
DC_2A_n257A	DC_2A_n257A	2A	n257A
DC_2C_n257A	DC_2A_n257A	CA_2C	n257A
DC_2A_n260 A DC_2A_n260G DC_2A_n260H DC_2A_n260I DC_2A_n260J DC_2A_n260K DC_2A_n260L DC_2A_n260MDC_2A_n260(2A)	DC_2A_n260A	2A	n260A CA_n260G CA_n260H CA_n260I CA_n260J CA_n260K CA_n260L CA_n260M CA_n260(2A) CA_n260(A-I) CA_n260(G-I)
DC_2A-2A_n260A DC_2A-2A_n260G DC_2A-2A_n260H DC_2A-2A_n260I DC_2A-2A_n260J DC_2A-2A_n260K DC_2A-2A_n260L DC_2A-2A_n260M	DC_2A_n260A	CA_2A-2A	n260A CA_n260G CA_n260H CA_n260I CA_n260J CA_n260K CA_n260L CA_n260M
DC_2C_n260A	DC_2A_n260A	CA_2C	n260A
DC_3A_n257A DC_3A_n257D DC_3A_n257E DC_3A_n257F	DC_3A_n257A	3A	n257A CA_n257D CA_n257E CA_n257F
DC_3A_n258A	DC_3A_n258A	3A	n258A
DC_5A-5A_n257A	DC_5A_n257A	CA_5A-5A	n257A
DC_5A-5A_n260A	DC_5A_n260A	CA_5A-5A	n260A
DC_5A_n257A	DC_5A_n257A	5A	n257A

DC_5A_n260A DC_5A_n260B DC_5A_n260C DC_5A_n260D DC_5A_n260E DC_5A_n260F DC_5A_n260G DC_5A_n260H DC_5A_n260I DC_5A_n260J DC_5A_n260K DC_5A_n260L DC_5A_n260M DC_5A_n260O DC_5A_n260P DC_5A_n260Q DC_5A_n260(2A) DC_5A_n260(3A) DC_5A_n260(4A) DC_5A-n260(A-I) DC_5A_n260(D-G) DC_5A_n260(D-H) DC_5A_n260(D-I) DC_5A_n260(D-O) DC_5A_n260(D-P) DC_5A_n260(D-Q) DC_5A_n260(E-O) DC_5A_n260(E-P) DC_5A_n260(E-Q) DC_5A-n260(G-I)	DC_5A_n260A	5A	n260A CA_n260B CA_n260C CA_n260D CA_n260E CA_n260F CA_n260G CA_n260H CA_n260I CA_n260J CA_n260K CA_n260L CA_n260M CA_n260O CA_n260P CA_n260Q CA_n260(2A) CA_n260(3A) CA_n260(4A) CA_n260(A-I) CA_n260(D-G) CA_n260(D-H) CA_n260(D-I) CA_n260(D-O) CA_n260(D-P) CA_n260(D-Q) CA_n260(E-O) CA_n260(E-P) CA_n260(E-Q) CA_n260(G-I)
DC_5A_n261A DC_5A_n261B DC_5A_n261C DC_5A_n261D DC_5A_n261E DC_5A_n261F DC_5A_n261G DC_5A_n261H DC_5A_n261I DC_5A_n261J DC_5A_n261K DC_5A_n261L DC_5A_n261M DC_5A_n261O DC_5A_n261P DC_5A_n261Q DC_5A_n261(2A) DC_5A_n261(3A) DC_5A_n261(4A) DC_5A_n261(D-G) DC_5A_n261(D-H) DC_5A_n261(D-I) DC_5A_n261(D-O) DC_5A_n261(D-P) DC_5A_n261(D-Q) DC_5A_n261(E-O) DC_5A_n261(E-P) DC_5A_n261(E-Q)	DC_5A_n261A	5A	n261A CA_n261B CA_n261C CA_n261D CA_n261E CA_n261F CA_n261G CA_n261H CA_n261I CA_n261J CA_n261K CA_n261L CA_n261M CA_n261O CA_n261P CA_n261Q CA_n261(2A) CA_n261(3A) CA_n261(4A) CA_n261(D-G) CA_n261(D-H) CA_n261(D-I) CA_n261(D-O) CA_n261(D-P) CA_n261(D-Q) CA_n261(E-O) CA_n261(E-P) CA_n261(E-Q)
DC_5B_n257A	DC_5B_n257A	CA_5B	n257A
DC_5B_n260A	DC_5B_n260A	CA_5B	n260A
DC_7A-7A_n257A	DC_7A_n257A	CA_7A-7A	n257A
DC_7A_n257A	DC_7A_n257A	7A	n257A
DC_7A_n258A	DC_7A_n258A	7A	n258A
DC_8A_n257A	DC_8A_n257A	8A	n257A
DC_8A_n258A	DC_8A_n258A	8A	n258A

DC_11A_n257A	DC_11A_n257A	11A	n257A
DC_12A_n260A DC_12A_n260G DC_12A_n260H DC_12A_n260I DC_12A_n260J DC_12A_n260K DC_12A_n260L DC_12A_n260M DC_12A_n260(A-I) DC_12A_n260(G-I)	DC_12A_n260A	12A	n260A CA_n260G CA_n260H CA_n260I CA_n260J CA_n260K CA_n260L CA_n260M CA_n260(A-I) CA_n260(G-I)
DC_13A_n257A	DC_13A_n257A	13A	n257A
DC_13A_n260A	DC_13A_n260A	13A	n260A
DC_18A_n257A	DC_18A_n257A	18A	n257A
DC_19A_n257A DC_19A_n257D DC_19A_n257E DC_19A_n257F	DC_19A_n257A	19A	n257A CA_n257D CA_n257E CA_n257F
DC_20A_n258A	DC_20A_n258A	20A	n258A
DC_21A_n257A DC_21A_n257D DC_21A_n257E DC_21A_n257F	DC_21A_n257A	21A	n257A CA_n257D CA_n257E CA_n257F
DC_26A_n257A	DC_26A_n257A	26A	n257A
DC_28A_n257A DC_28A_n257D DC_28A_n257E DC_28A_n257F	DC_28A_n257A	28A	n257A CA_n257D CA_n257E CA_n257F
DC_28A_n258A	DC_28A_n258A	28A	n258A
DC_30A_n260A DC_30A_n260G DC_30A_n260H DC_30A_n260I DC_30A_n260J DC_30A_n260K DC_30A_n260L DC_30A_n260M DC_30A_n260(A-I) DC_30A_n260(G-I)	DC_30A_n260A	30A	n260A CA_n260G CA_n260H CA_n260I CA_n260J CA_n260K CA_n260L CA_n260M CA_n260(A-I) CA_n260(G-I)
DC_39A_n258A	DC_39A_n258A	39A	n258A
DC_41A_n257A DC_41C_n257A	DC_41A_n257A	41A CA_41C	n257A
DC_41A_n258A	DC_41A_n258A	41A	n258A
DC_41C_n257A	DC_41C_n257A	CA_41C	n257A
DC_42A_n257A DC_42C_n257A DC_42A_n257D DC_42A_n257E DC_42A_n257F	DC_42A_n257A	42A CA_42C 42A 42A 42A	n257A n257A CA_n257D CA_n257E CA_n257F
DC_42C_n257A DC_42C_n257D DC_42C_n257E DC_42C_n257F	DC_42C_n257A	CA_42C	n257A CA_n257D CA_n257E CA_n257F
DC_42D_n257A	DC_42C_n257A	CA_42D	n257A
DC_42E_n257A	DC_42A_n257A	CA_42E	n257A
DC_48A-48A_n257A	DC_48A_n257A	CA_48A-48A	n257A
DC_48A-48A_n260A	DC_48A_n260A	CA_48A-48A	n260A
DC_48A_n257A	DC_48A_n257A	48A	n257A
DC_48C_n257A	DC_48C_n257A	CA_48C	n257A
DC_48A_n260A	DC_48A_n260A	48A	n260A

DC_48C_n260A	DC_48C_n260A	CA_48C	n260A
DC_66A-66A_n257A	DC_66A_n257A	CA_66A-66A	n257A
DC_66A-66A_n260A DC_66A-66A_n260G DC_66A-66A_n260H DC_66A-66A_n260I DC_66A-66A_n260J DC_66A-66A_n260K DC_66A-66A_n260L DC_66A-66A_n260M	DC_66A_n260A	CA_66A-66A	n260A CA_n260G CA_n260H CA_n260I CA_n260J CA_n260K CA_n260L CA_n260M
DC_66A_n257A DC_66A_n257(2A) DC_66A_n257G DC_66A_n257H DC_66A_n257I DC_66A_n257J DC_66A_n257K DC_66A_n257L DC_66A_n257M	DC_66A_n257A	66A	n257A CA_n257(2A) CA_n257G CA_n257H CA_n257I CA_n257J CA_n257K CA_n257L CA_n257M
DC_66A_n260A DC_66A_n260D DC_66A_n260E DC_66A_n260F DC_66A_n260G DC_66A_n260H DC_66A_n260I DC_66A_n260J DC_66A_n260K DC_66A_n260L DC_66A_n260M DC_66A_n260O DC_66A_n260P DC_66A_n260Q DC_66A_n260(2A) DC_66A_n260(3A) DC_66A_n260(4A) DC_66A-n260(A-I) DC_66A_n260(D-G) DC_66A_n260(D-H) DC_66A_n260(D-I) DC_66A_n260(D-O) DC_66A_n260(D-P) DC_66A_n260(D-Q) DC_66A_n260(E-O) DC_66A_n260(E-P) DC_66A_n260(E-Q) DC_66A-n260(G-I)	DC_66A_n260A	66A	n260A CA_n260D CA_n260E CA_n260F CA_n260G CA_n260H CA_n260I CA_n260J CA_n260K CA_n260L CA_n260M CA_n260O CA_n260P CA_n260Q CA_n260(2A) CA_n260(3A) CA_n260(4A) CA_n260(A-I) CA_n260(D-G) CA_n260(D-H) CA_n260(D-I) CA_n260(D-O) CA_n260(D-P) CA_n260(D-Q) CA_n260(E-O) CA_n260(E-P) CA_n260(E-Q) CA_n260(G-I)
DC_66C_n257A	DC_66C_n257A	CA_66C	n257A

DC_66A_n261A DC_66A_n261D DC_66A_n261E DC_66A_n261F DC_66A_n261G DC_66A_n261H DC_66A_n261I DC_66A_n261J DC_66A_n261K DC_66A_n261L DC_66A_n261M DC_66A_n261O DC_66A_n261P DC_66A_n261Q DC_66A_n261(2A) DC_66A_n261(3A) DC_66A_n261(4A) DC_66A_n261(D-G) DC_66A_n261(D-H) DC_66A_n261(D-I) DC_66A_n261(D-O) DC_66A_n261(D-P) DC_66A_n261(D-Q) DC_66A_n261(E-O) DC_66A_n261(E-P) DC_66A_n261(E-Q)	DC_66A_n261A	66A	n261A CA_n261D CA_n261E CA_n261F CA_n261G CA_n261H CA_n261I CA_n261J CA_n261K CA_n261L CA_n261M CA_n261O CA_n261P CA_n261Q CA_n261(2A) CA_n261(3A) CA_n261(4A) CA_n261(D-G) CA_n261(D-H) CA_n261(D-I) CA_n261(D-O) CA_n261(D-P) CA_n261(D-Q) CA_n261(E-O) CA_n261(E-P) CA_n261(E-Q)
NOTE 1: Uplink CA configurations are the configurations supported by the present release of specifications.			

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)	E-UTRA configuration	NR configuration
DC_1A-3A_n257A	DC_1A_n257A DC_3A_n257A	CA_1A-3A	n257A
DC_1A-3A_n257D DC_1A-3A_n257E DC_1A-3A_n257F	DC_1A_n257A DC_1A_n257D DC_3A_n257A DC_3A_n257D	CA_1A-3A	CA_n257D CA_n257E CA_n257F
DC_1A-5A_n257A	DC_1A_n257A DC_5A_n257A	CA_1A-5A	n257A
DC_1A-7A_n257A	DC_1A_n257A DC_7A_n257A	CA_1A-7A	n257A
DC_1A-7A-7A_n257A	DC_1A_n257A DC_7A_n257A	CA_1A-7A-7A	n257A
DC_1A-8A_n257A	DC_1A_n 257A DC_8A_n257A	CA_1A-8A	n257A
DC_1A-18A_n257A	DC_1A_n 257A DC_18A_n257A	CA_1A-18A	n257A
DC_1A-19A_n257A	DC_1A_n257A DC_19A_n257A	CA_1A-19A	n257A
DC_1A-19A_n257D DC_1A-19A_n257E DC_1A-19A_n257F	DC_1A-257A DC_1A-257D DC_19A_n257A DC_19A_n257D	CA_1A-19A	CA_n257D CA_n257E CA_n257F
DC_1A-21A_n257A	DC_1A_n257A DC_21A_n257A	CA_1A-21A	n257A
DC_1A-21A_n257D DC_1A-21A_n257E DC_1A-21A_n257F	DC_1A_n257A DC_1A_n257D DC_21A_n257A DC_21A_n257D	CA_1A-21A	CA_n257D CA_n257E CA_n257F
DC_1A-28A_n257A	DC_1A_n257A DC_28A_n257A	CA_1A-28A	n257A
DC_1A-28A_n257D DC_1A-28A_n257E DC_1A-28A_n257F	DC_1A_n257A DC_1A_n257D DC_28A_n257A DC_28A_n257D	CA_1A-28A	CA_n257D CA_n257E CA_n257F
DC_1A-41A_n257A	DC_1A_n257A DC_41A_n257A	CA_1A-41A	n257A
DC_1A-41C_n257A	DC_1A_n257A DC_41C_n257A	CA_1A-41C	n257A
DC_1A-42A_n257A	DC_1A_n257A DC_42A_n257A	CA_1A-42A	n257A
DC_1A-42A_n257D DC_1A-42A_n257E DC_1A-42A_n257F	DC_1A_n257A DC_1A_n257D DC_42A_n257A DC_42A_n257D	CA_1A-42A	CA_n257D CA_n257E CA_n257F
DC_1A-42C_n257A	DC_1A_n257A DC_42A_n257A	CA_1A-42C	n257A
DC_1A-42D_n257A	DC_1A_n257A DC_42A_n257A	CA_1A-42D	n257A
DC_1A-42D_n257D DC_1A-42D_n257E DC_1A-42D_n257F	DC_1A_n257A DC_1A_n257D DC_42A_n257A DC_42A_n257D	CA_1A-42D	CA_n257D CA_n257E CA_n257F
DC_1A-42E_n257A	DC_1A_n257A DC_42A_n257A	CA_1A-42E	n257A
DC_1A-42E_n257D DC_1A-42E_n257E DC_1A-42E_n257F	DC_1A_n257A DC_1A_n257D DC_42A_n257A DC_42A_n257D	CA_1A-42E	CA_n257D CA_n257E CA_n257F
DC_2A-5A_n257A	DC_2A_n257A DC_5A_n257A	CA_2A-5A	n257A

DC_2A-5A_n260A DC_2A-5A_n260G DC_2A-5A_n260H DC_2A-5A_n260I DC_2A-5A_n260J DC_2A-5A_n260K DC_2A-5A_n260L DC_2A-5A_n260M	DC_2A_n260A DC_5A_n260A	CA_2A-5A	n260A CA_n260G CA_n260H CA_n260I CA_n260J CA_n260K CA_n260L CA_n260M
DC_2A-12A_n260A DC_2A-12A_n260G DC_2A-12A_n260H DC_2A-12A_n260I DC_2A-12A_n260J DC_2A-12A_n260K DC_2A-12A_n260L DC_2A-12A_n260M	DC_2A_n260A DC_12A_n260A	CA_2A-12A	n260A CA_n260G CA_n260H CA_n260I CA_n260J CA_n260K CA_n260L CA_n260M
DC_2A-13A_n257A	DC_2A_n257A DC_13A_n257A	CA_2A-13A	n257A
DC_2A-13A_n260A	DC_2A_n260A DC_13A_n260A	CA_2A-13A	n260A
DC_2A-30A_n260A DC_2A-30A_n260G DC_2A-30A_n260H DC_2A-30A_n260I DC_2A-30A_n260J DC_2A-30A_n260K DC_2A-30A_n260L DC_2A-30A_n260M	DC_2A_n260A DC_30A_n260A	CA_2A-30A	n260A CA_n260G CA_n260H CA_n260I CA_n260J CA_n260K CA_n260L CA_n260M
DC_2A-66A_n257A	DC_2A_n257A DC_66A_n257A	CA_2A-66A	n257A
DC_2A-66A_n260A DC_2A-66A_n260G DC_2A-66A_n260H DC_2A-66A_n260I DC_2A-66A_n260J DC_2A-66A_n260K DC_2A-66A_n260L DC_2A-66A_n260M	DC_2A_n260A DC_66A_n260A	CA_2A-66A	n260A CA_n260G CA_n260H CA_n260I CA_n260J CA_n260K CA_n260L CA_n260M
DC_3A-5A_n257A	DC_3A_n257A DC_5A_n257A	CA_3A-5A	n257A
DC_3A-7A-7A_n257A	DC_3A_n257A DC_7A_n257A	CA_3A-7A-7A	n257A
DC_3A-7A_n257A	DC_3A_n257A DC_7A_n257A	CA_3A-7A	n257A
DC_3A-19A_n257A	DC_3A_n257A DC_19A_n257A	CA_3A-19A	n257A
DC_3A-19A_n257D DC_3A-19A_n257E DC_3A-19A_n257F	DC_3A_n257A DC_3A_n257D DC_19A_n257A DC_19A_n257D	CA_3A-19A	CA_n257D CA_n257E CA_n257F
DC_3A-21A_n257A	DC_3A_n257A DC_21A_n257A	CA_3A-21A	n257A
DC_3A-21A_n257D DC_3A-21A_n257E DC_3A-21A_n257F	DC_3A_n257A DC_3A_n257D DC_21A_n257A DC_21A_n257D	CA_3A-21A	CA_n257D CA_n257E CA_n257F
DC_3A-28A_n257A	DC_3A_n257A DC_28A_n257A	CA_3A-28A	n257A
DC_3A-28A_n257D DC_3A-28A_n257E DC_3A-28A_n257F	DC_3A_n257A DC_3A_n257D DC_28A_n257A DC_28A_n257D	CA_3A-28A	CA_n257D CA_n257E CA_n257F
DC_3A-41A_n257A DC_3A-41C_n257A	DC_3A_n257A DC_41A_n257A DC_41C_n257a	CA_3A-41A CA_3A-41C	n257A
DC_3A-42A_n257A	DC_3A_n257A DC_42A_n257A	CA_3A-42A	n257A

DC_3A-42A_n257D DC_3A-42A_n257E DC_3A-42A_n257F	DC_3A_n257A DC_3A_n257D DC_42A_n257A DC_42A_n257D	CA_3A-42A	CA_n257D CA_n257E CA_n257F
DC_3A-42C_n257A	DC_3A_n257A DC_42A_n257A	CA_3A-42C	n257A
DC_3A-42D_n257A	DC_3A_n257A DC_42A_n257A	CA_3A-42D	n257A
DC_3A-42D_n257D DC_3A-42D_n257E DC_3A-42D_n257F	DC_3A_n257A DC_3A_n257D DC_42A_n257A DC_42A_n257D	CA_3A-42D	CA_n257D CA_n257E CA_n257F
DC_3A-42E_n257A	DC_3A_n257A DC_42A_n257A	CA_3A-42E	n257A
DC_3A-42E_n257D DC_3A-42E_n257E DC_3A-42E_n257F	DC_3A_n257A DC_3A_n257D DC_42A_n257A DC_42A_n257D	CA_3A-42E	CA_n257D CA_n257E CA_n257F
DC_5A-30A_n260A DC_5A-30A_n260G DC_5A-30A_n260H DC_5A-30A_n260I DC_5A-30A_n260J DC_5A-30A_n260K DC_5A-30A_n260L DC_5A-30A_n260M	DC_5A_n260A DC_30A_n260A	CA_5A-30A	n260A CA_n260G CA_n260H CA_n260I CA_n260J CA_n260K CA_n260L CA_n260M
DC_5A-66A_n257A	DC_5A_n257A DC_66A_n257A	CA_5A-66A	n257A
DC_5A-66A_n260A DC_5A-66A_n260G DC_5A-66A_n260H DC_5A-66A_n260I DC_5A-66A_n260J DC_5A-66A_n260K DC_5A-66A_n260L DC_5A-66A_n260M	DC_5A_n260A DC_66A_n260A	CA_5A-66A	n260A CA_n260G CA_n260H CA_n260I CA_n260J CA_n260K CA_n260L CA_n260M
DC_5A-7A-7A_n257A	DC_5A_n257A DC_7A_n257A	CA_5A-7A-7A	n257A
DC_5A-7A_n257A	DC_5A_n257A DC_7A_n257A	CA_5A-7A	n257A
DC_12A-30A_n260A DC_12A-30A_n260G DC_12A-30A_n260H DC_12A-30A_n260I DC_12A-30A_n260J DC_12A-30A_n260K DC_12A-30A_n260L DC_12A-30A_n260M	DC_12A_n260A DC_30A_n260A	CA_12A-30A	n260A CA_n260G CA_n260H CA_n260I CA_n260J CA_n260K CA_n260L CA_n260M
DC_12A-66A_n260A DC_12A-66A_n260G DC_12A-66A_n260H DC_12A-66A_n260I DC_12A-66A_n260J DC_12A-66A_n260K DC_12A-66A_n260L DC_12A-66A_n260M	DC_12A_n260A DC_66A_n260A	CA_12A-66A	n260A CA_n260G CA_n260H CA_n260I CA_n260J CA_n260K CA_n260L CA_n260M
DC_13A-66A_n257A	DC_13A_n257A DC_66A_n257A	CA_13A-66A	n257A
DC_13A-66A_n260A	DC_13A_n260A DC_66A_n260A	CA_13A-66A	n260A
DC_18A-28A-n257A	DC_18A_n257A DC_28A_n257A	CA_18A-28A	n257A
DC_19A-21A_n257A	DC_19A_n257A DC_21A_n257A	CA_19A-21A	n257A
DC_19A-21A_n257D DC_19A-21A_n257E DC_19A-21A_n257F	DC_19A_n257A DC_19A_n257D DC_21A_n257A DC_21A_n257D	CA_19A-21A	CA_n257D CA_n257E CA_n257F

DC_19A-42A_n257A	DC_19A_n257A DC_42A_n257A	CA_19A-42A	n257A
CA_n257D CA_n257E CA_n257F	CA_n257D CA_n257E CA_n257F	CA_n257D CA_n257E CA_n257F	CA_n257D CA_n257E CA_n257F
DC_19A-42C_n257A	DC_19A_n257A DC_42A_n257A	CA_19A-42C	n257A
DC_19A-42D_n257A	DC_19A_n257A DC_42A_n257A	CA_19A-42D	n257A
DC_19A-42D_n257D DC_19A-42D_n257E DC_19A-42D_n257F	DC_19A_n257A DC_19A_n257D DC_42A_n257A DC_42A_n257D	CA_19A-42D	CA_n257D CA_n257E CA_n257F
DC_21A-28A_n257A	DC_21A_n257A DC_28A_n257A	CA_21A-28A	n257A
DC_21A-28A_n257D DC_21A-28A_n257E DC_21A-28A_n257F	DC_21A_n257A DC_21A_n257D DC_28A_n257A DC_28A_n257D	CA_21A-28A	CA_n257D CA_n257E CA_n257F
DC_21A-42A_n257A	DC_21A_n257A DC_42A_n257A	CA_21A-42A	n257A
DC_21A-42A_n257D DC_21A-42A_n257E DC_21A-42A_n257F	DC_21A_n257A DC_21A_n257D DC_42A_n257A DC_42A_n257D	CA_21A-42A	CA_n257D CA_n257E CA_n257F
DC_21A-42C_n257A	DC_21A_n257A DC_42A_n257A	CA_21A-42C	n257A
DC_21A-42D_n257A	DC_21A_n257A DC_42A_n257A	CA_21A-42D	n257A
DC_21A-42D_n257D DC_21A-42D_n257E DC_21A-42D_n257F	DC_21A_n257A DC_21A_n257D DC_42A_n257A DC_42A_n257D	CA_21A-42D	CA_n257D CA_n257E CA_n257F
DC_21A-42E_n257A	DC_21A_n257A DC_42A_n257A	CA_21A-42E	n257A
DC_21A-42E_n257D DC_21A-42E_n257E DC_21A-42E_n257F	DC_21A_n257A DC_21A_n257D DC_42A_n257A DC_42A_n257D	CA_21A-42E	CA_n257D CA_n257E CA_n257F
DC_28A-42A_n257A	DC_28A_n257A DC_42A_n257A	CA_28A-42A	n257A
DC_28A-42C_n257A	DC_28A_n257A DC_42A_n257A	CA_28A-42C	n257A
DC_30A-66A_n260A DC_30A-66A_n260G DC_30A-66A_n260H DC_30A-66A_n260I DC_30A-66A_n260J DC_30A-66A_n260K DC_30A-66A_n260L DC_30A-66A_n260M	DC_30A_n260A DC_66A_n260A	CA_30A-66A	n260A CA_n260G CA_n260H CA_n260I CA_n260J CA_n260K CA_n260L CA_n260M
DC_41A-42A_n257A	DC_41A_n257A DC_42A_n257A	CA_41A-42A	n257A
DC_41A-42C_n257A	DC_41A_n257A DC_42C_n257A	CA_41A-42C	n257A
DC_41C-42A_n257A	DC_41C_n257A DC_42A_n257A	CA_41C-42A	n257A
DC_41C-42C_n257A	DC_41A_n257A DC_42A_n257A	CA_41C-42C	n257A
NOTE 1: Uplink CA configurations are the configurations supported by the present release of specifications.			

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)	E-UTRA configuration	NR configuration
DC_1A-3A-5A_n257A	DC_1A_n257A DC_3A_n257A DC_5A_n257A	CA_1A-3A-5A	n257A
DC_1A-3A-7A-7A_n257A	DC_1A_n257A DC_3A_n257A DC_7A_n257A	CA_1A-3A-7A-7A	n257A
DC_1A-3A-7A_n257A	DC_1A_n257A DC_3A_n257A DC_7A_n257A	CA_1A-3A-7A	n257A
DC_1A-3A-19A_n257A	DC_1A_n257A DC_3A_n257A DC_19A_n257A	CA_1A-3A-19A	n257A
DC_1A-3A-21A_n257A	DC_1A_n257A DC_3A_n257A DC_21A_n257A	CA_1A-3A-21A	n257A
DC_1A-3A-28A_n257A	DC_1A_n257A DC_3A_n257A DC_28A_n257A	CA_1A-3A-28A	n257A
DC_1A-3A-42A_n257A	DC_1A_n257A DC_3A_n257A DC_42A_n257A	CA_1A-3A-42A	n257A
DC_1A-3A-42C_n257A	DC_1A_n257A DC_3A_n257A DC_42A_n257A	CA_1A-3A-42C	n257A
DC_1A-3A-42C_n257D	DC_1A_n257A DC_3A_n257A DC_42A_n257A	CA_1A-3A-42C	CA_n257D
DC_1A-3A-42C_n257E	DC_1A_n257A DC_3A_n257A DC_42A_n257A	CA_1A-3A-42C	CA_n257E
DC_1A-3A-42C_n257F	DC_1A_n257A DC_3A_n257A DC_42A_n257A	CA_1A-3A-42C	CA_n257F
DC_1A-5A-7A-7A_n257A	DC_1A_n257A DC_5A_n257A DC_7A_n257A	CA_1A-5A-7A-7A	n257A
DC_1A-5A-7A_n257A	DC_1A_n257A DC_5A_n257A DC_7A_n257A	CA_1A-5A-7A	n257A
DC_1A-18A-28A_n257A	DC_1A_n257A DC_18A_n257A DC_28A_n257A	CA_1A-18A-28A	n257A
DC_1A-19A-21A_n257A DC_1A-19A-21A_n257D DC_1A-19A-21A_n257E DC_1A-19A-21A_n257F	DC_1A_n257A DC_19A_n257A DC_21A_n257A	CA_1A-19A-21A	n257A CA_n257D CA_n257E CA_n257F
DC_1A-19A-42A_n257A	DC_1A_n257A DC_19A_n257A DC_42A_n257A	CA_1A-19A-42A	n257A
DC_1A-19A-42C_n257A	DC_1A_n257A DC_19A_n257A DC_42A_n257A	CA_1A-19A-42C	n257A
DC_1A-19A-42C_n257D	DC_1A_n257A DC_19A_n257A DC_42A_n257A	CA_1A-19A-42A	CA_n257D
DC_1A-19A-42C_n257E	DC_1A_n257A DC_19A_n257A DC_42A_n257A	CA_1A-19A-42A	CA_n257E
DC_1A-19A-42C_n257F	DC_1A_n257A DC_19A_n257A DC_42A_n257A	CA_1A-19A-42A	CA_n257F
DC_1A-21A-28A_n257A	DC_1A_n257A DC_21A_n257A DC_28A_n257A	CA_1A-21A-28A	n257A

DC_1A-21A-42A_n257A	DC_1A_n257A DC_21A_n257A DC_42A_n257A	CA_1A-21A-42A	n257A
DC_1A-21A-42C_n257A	DC_1A_n257A DC_21A_n257A DC_42A_n257A	CA_1A-21A-42C	n257A
DC_1A-21A-42C_n257D	DC_1A_n257A DC_21A_n257A DC_42A_n257A	CA_1A-21A-42C	CA_n257D
DC_1A-21A-42C_n257E	DC_1A_n257A DC_21A_n257A DC_42A_n257A	CA_1A-21A-42C	CA_n257E
DC_1A-21A-42C_n257F	DC_1A_n257A DC_21A_n257A DC_42A_n257A	CA_1A-21A-42C	CA_n257F
DC_1A-28A-42A_n257A	DC_1A_n257A DC_28A_n257A DC_42A_n257A	CA_1A-28A-42A	n257A
DC_1A-28A-42C_n257A	DC_1A_n257A DC_28A_n257A DC_42A_n257A	CA_1A-28A-42C	n257A
DC_1A-41A-42A_n257A	DC_1A_n257A DC_41A_n257A DC_42A_n257A	CA_1A-41A-42A	n257A
DC_1A-41A-42C_n257A	DC_1A_n257A DC_41A_n257A DC_42A_n257A	CA_1A-41A-42C	n257A
DC_1A-41C-42A_n257A	DC_1A_n257A DC_41A_n257A DC_42A_n257A	CA_1A-41C-42A	n257A
DC_1A-41C-42C_n257A	DC_1A_n257A DC_41A_n257A DC_42A_n257A	CA_1A-41C-42C	n257A
DC_3A-5A-7A-7A_n257A	DC_3A_n257A DC_5A_n257A DC_7A_n257A	CA_3A-5A-7A-7A	n257A
DC_3A-5A-7A_n257A	DC_3A_n257A DC_5A_n257A DC_7A_n257A	CA_3A-5A-7A	n257A
DC_3A-19A-21A_n257A	DC_3A_n257A DC_19A_n257A DC_21A_n257A	CA_3A-19A-21A	n257A
DC_3A-19A-42A_n257A	DC_3A_n257A DC_19A_n257A DC_42A_n257A	CA_3A-19A-42A	n257A
DC_3A-19A-42C_n257A	DC_3A_n257A DC_19A_n257A DC_42A_n257A	CA_3A-19A-42C	n257A
DC_3A-19A-42C_n257D	DC_3A_n257A DC_3A_n257D DC_19A_n257A DC_19A_n257D DC_42A_n257A DC_42A_n257D	CA_3A-19A-42C	CA_n257D
DC_3A-19A-42C_n257E	DC_3A_n257A DC_3A_n257D DC_19A_n257A DC_19A_n257D DC_42A_n257A DC_42A_n257D	CA_3A-19A-42C	CA_n257E
DC_3A-19A-42C_n257F	DC_3A_n257A DC_3A_n257D DC_19A_n257A DC_19A_n257D DC_42A_n257A DC_42A_n257D	CA_3A-19A-42C	CA_n257F

DC_3A-21A-42A_n257A	DC_3A_n257A DC_21A_n257A DC_42A_n257A	CA_3A-21A-42A	n257A
DC_3A-21A-42C_n257A	DC_3A_n257A DC_21A_n257A DC_42A_n257A	CA_3A-21A-42C	n257A
DC_3A-21A-42C_n257D	DC_3A_n257A DC_3A_n257D DC_21A_n257A DC_21A_n257D DC_42A_n257A DC_42A_n257D	CA_3A-21A-42C	CA_n257D
DC_3A-21A-42C_n257E	DC_3A_n257A DC_3A_n257A DC_21A_n257A DC_21A_n257A DC_42A_n257A DC_42A_n257D	CA_3A-21A-42C	CA_n257E
DC_3A-21A-42C_n257F	DC_3A_n257A DC_3A_n257A DC_21A_n257A DC_21A_n257A DC_42A_n257A DC_42A_n257D	CA_3A-21A-42C	CA_n257F
DC_3A-28A-42A_n257A	DC_3A_n257A DC_28A_n257A DC_42A_n257A	CA_3A-28A-42A	n257A
DC_3A-28A-42C_n257A	DC_3A_n257A DC_28A_n257A DC_42A_n257A	CA_3A-28A-42C	n257A
DC_19A-21A-42A_n257A	DC_19A_n257A DC_21A_n257A DC_42A_n257A	CA_19A-21A-42A	n257A
DC_19A-21A-42C_n257A	DC_19A_n257A DC_21A_n257A DC_42A_n257A	CA_19A-21A-42C	n257A
DC_19A-21A-42C_n257D	DC_19A_n257A DC_19A_n257D DC_21A_n257A DC_21A_n257D DC_42A_n257A DC_42A_n257D	CA_19A-21A-42C	CA_n257D
DC_19A-21A-42C_n257E	DC_19A_n257A DC_19A_n257D DC_21A_n257A DC_21A_n257D DC_42A_n257A DC_42A_n257D	CA_19A-21A-42C	CA_n257E
DC_19A-21A-42C_n257F	DC_19A_n257A DC_19A_n257D DC_21A_n257A DC_21A_n257D DC_42A_n257A DC_42A_n257D	CA_19A-21A-42C	CA_n257F
DC_21A-28A-42A_n257A	DC_21A_n257A DC_28A_n257A DC_42A_n257A	CA_21A-28A-42A	n257A
DC_21A-28A-42C_n257A	DC_21A_n257A DC_28A_n257A DC_42A_n257A	CA_21A-28A-42A	n257A
NOTE 1: Uplink CA configurations are the configurations supported by the present release of specifications.			

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)	E-UTRA configuration	NR configuration
DC_1A-3A-5A-7A_n257A	DC_1A_n257A DC_3A_n257A DC_5A_n257A DC_7A_n257A	CA_1A-3A-5A-7A	n257A
DC_1A-3A-5A-7A-7A_n257A	DC_1A_n257A DC_3A_n257A DC_5A_n257A DC_7A_n257A	CA_1A-3A-5A-7A-7A	n257A
DC_1A-3A-19A-21A_n257A	DC_1A_n257A DC_3A_n257A DC_19A_n257A DC_21A_n257A	CA_1A-3A-19A-21A	n257A
DC_1A-3A-19A-21A_n257D	DC_1A_n257A DC_3A_n257A DC_19A_n257A DC_21A_n257A	CA_1A-3A-19A-21A	CA_n257D
DC_1A-3A-19A-21A_n257E	DC_1A_n257A DC_3A_n257A DC_19A_n257A DC_21A_n257A	CA_1A-3A-19A-21A	CA_n257E
DC_1A-3A-19A-21A_n257F	DC_1A_n257A DC_3A_n257A DC_19A_n257A DC_21A_n257A	CA_1A-3A-19A-21A	CA_n257F
DC_1A-3A-19A-42A_n257A	DC_1A_n257A DC_3A_n257A DC_19A_n257A DC_42A_n257A	CA_1A-3A-19A-42A	n257A
DC_1A-3A-19A-42A_n257D	DC_1A_n257A DC_1A_n257D DC_3A_n257A DC_3A_n257D DC_19A_n257A DC_19A_n257D DC_42A_n257A DC_42A_n257D	CA_1A-3A-19A-42A	CA_n257D
DC_1A-3A-19A-42A_n257E	DC_1A_n257A DC_1A_n257D DC_3A_n257A DC_3A_n257D DC_19A_n257A DC_19A_n257D DC_42A_n257A DC_42A_n257D	CA_1A-3A-19A-42A	CA_n257E
DC_1A-3A-19A-42A_n257F	DC_1A_n257A DC_1A_n257D DC_3A_n257A DC_3A_n257D DC_19A_n257A DC_19A_n257D DC_42A_n257A DC_42A_n257D	CA_1A-3A-19A-42A	CA_n257F
DC_1A-3A-19A-42C_n257A	DC_1A_n257A DC_3A_n257A DC_19A_n257A DC_42A_n257A	CA_1A-3A-19A-42C	n257A
DC_1A-3A-19A-42C_n257D	DC_1A_n257A DC_1A_n257D DC_3A_n257A DC_3A_n257D DC_19A_n257A DC_19A_n257D DC_42A_n257A DC_42A_n257D	CA_1A-3A-19A-42C	CA_n257D

DC_1A-3A-19A-42C_n257E	DC_1A_n257A DC_1A_n257D DC_3A_n257A DC_3A_n257D DC_19A_n257A DC_19A_n257D DC_42A_n257A DC_42A_n257D	CA_1A-3A-19A-42C	CA_n257E
DC_1A-3A-19A-42C_n257F	DC_1A_n257A DC_1A_n257D DC_3A_n257A DC_3A_n257D DC_19A_n257A DC_19A_n257D DC_42A_n257A DC_42A_n257D	CA_1A-3A-19A-42C	CA_n257F
DC_1A-3A-21A-42A_n257A	DC_1A_n257A DC_3A_n257A DC_21A_n257A DC_42A_n257A	CA_1A-3A-21A-42A	n257A
DC_1A-3A-21A-42C_n257A	DC_1A_n257A DC_3A_n257A DC_21A _n257A DC_42A_n257A	CA_1A-3A-21A-42C	n257A
DC_1A-3A-21A-42C_n257D	DC_1A_n257A DC_3A_n257A DC_21A _n257A DC_42A_n257A	CA_1A-3A-21A-42C	CA_n257D
DC_1A-3A-21A-42C_n257E	DC_1A_n257A DC_3A_n257A DC_21A _n257A DC_42A_n257A	CA_1A-3A-21A-42C	CA_n257E
DC_1A-3A-21A-42C_n257F	DC_1A_n257A DC_3A_n257A DC_21A _n257A DC_42A_n257A	CA_1A-3A-21A-42C	CA_n257F
DC_1A-3A-28A-42A_n257A	DC_1A_n257A DC_3A_n257A DC_28A_n257A DC_42A_n257A	CA_1A-3A-21A-42A	n257A
DC_1A-3A-28A-42C_n257A	DC_1A_n257A DC_3A_n257A DC_28A_n257A DC_42A_n257A	CA_1A-3A-28A-42C	n257A
DC_1A-19A-21A-42A_n257A	DC_1A_n257A DC_19A_n257A DC_21A_n257A DC_42A_n257A	CA_1A-19A-21A-42A	n257A
DC_1A-19A-21A-42A_n257D	DC_1A_n257A DC_19A_n257A DC_21A_n257A DC_42A_n257A	CA_1A-19A-21A-42A	CA_n257D
DC_1A-19A-21A-42A_n257E	DC_1A_n257A DC_19A_n257A DC_21A_n257A DC_42A_n257A	CA_1A-19A-21A-42A	CA_n257E
DC_1A-19A-21A-42A_n257F	DC_1A_n257A DC_19A_n257A DC_21A_n257A DC_42A_n257A	CA_1A-19A-21A-42A	CA_n257F
DC_1A-19A-21A-42C_n257A	DC_1A_n257A DC_19A_n257A DC_21A_n257A DC_42A_n257A	CA_1A-19A-21A-42C	n257A
DC_1A-19A-21A-42C_n257D	DC_1A_n257A DC_19A_n257A DC_21A_n257A DC_42A_n257A	CA_1A-19A-21A-42C	CA_n257D

DC_1A-19A-21A-42C_n257E	DC_1A_n257A DC_19A_n257A DC_21A_n257A DC_42A_n257A	CA_1A-19A-21A-42C	CA_n257E
DC_1A-19A-21A-42C_n257F	DC_1A_n257A DC_19A_n257A DC_21A_n257A DC_42A_n257A	CA_1A-19A-21A-42C	CA_n257F
DC_1A-19A-28A-42C_n257A	DC_1A_n257A DC_19A_n257A DC_28A_n257A DC_42A_n257A	CA_1A-19A-28A-42C	n257A
DC_1A-21A-28A-42A_n257A	DC_1A_n257A DC_21A_n257A DC_28A_n257A DC_42A_n257A	CA_1A-21A-28A-42A	n257A
NOTE 1: Uplink CA configurations are the configurations supported by the present release of specifications.			

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

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

EN-DC configuration	Uplink EN-DC configuration (NOTE 1)	E-UTRA configuration	NR configuration
FFS			
NOTE 1: Uplink CA configurations are the configurations supported by the present release of specifications.			

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

Supported channel bandwidths for E-UTRA operating bands and CA configurations are defined in TS 36.521-1 [10] and for NR operating bands and CA configurations in TS 38.521-1 [8], TS 38521-2 [9] and present document.

5.5B.6.1 Inter-band EN-DC configurations including FR1 and FR2 (two bands)

This section is N/A.

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)	E-UTRA configuration	NR configuration
DC_1A_n77A-n257A	DC_1A_n77A DC_1A_n257A DC_1A_n77A-n257A	1A	CA_n77A-n257A
DC_1A_n77A-n257D	DC_1A_n77A DC_1A-n257A DC_1A_n77A-n257A	1A	CA_n77A-n257D
DC_1A_n77A-n257E	DC_1A_n77A DC_1A_n257A DC_1A_n77A-n257A	1A	CA_n77A-n257E
DC_1A_n77A-n257F	DC_1A_n77A DC_1A_n257A DC_1A_n77A-n257A	1A	CA_n77A-n257F
DC_1A_n77C-n257A	DC_1A_n77A DC_1A_n257A DC_1A_n77A-n257A	1A	CA_n77C-n257A
DC_1A_n77C-n257D	DC_1A_n77A DC_1A_n257A DC_1A_n77A-n257A	1A	CA_n77C-n257D
DC_1A_n77C-n257E	DC_1A_n77A DC_1A_n257A DC_1A_n77A-n257A	1A	CA_n77C-n257E
DC_1A_n77C-n257F	DC_1A_n77A DC_1A_n257A DC_1A_n77A-n257A	1A	CA_n77C-n257F
DC_1A_n78A-n257A	DC_1A_n78A DC_1A_n257A DC_1A_n78A-n257A	1A	CA_n78A-n257A
DC_1A_n78A-n257D	DC_1A_n78A DC_1A-n257A DC_1A_n78A-n257A	1A	CA_n78A-n257D
DC_1A_n78A-n257E	DC_1A_n78A DC_1A_n257A DC_1A_n78A-n257A	1A	CA_n78A-n257E
DC_1A_n78A-n257F	DC_1A_n78A DC_1A_n257A DC_1A_n78A-n257A	1A	CA_n78A-n257F
DC_1A_n78C-n257A	DC_1A_n78A DC_1A_n257A DC_1A_n78A-n257A	1A	CA_n78C-n257A
DC_1A_n78C-n257D	DC_1A_n78A DC_1A_n257A DC_1A_n78A-n257A	1A	CA_n78C-n257D
DC_1A_n78C-n257E	DC_1A_n78A DC_1A_n257A DC_1A_n78A-n257A	1A	CA_n78C-n257E
DC_1A_n78C-n257F	DC_1A_n78A DC_1A_n257A DC_1A_n78A-n257A	1A	CA_n78C-n257F
DC_1A_n79A-n257A	DC_1A_n79A DC_1A_n257A DC_1A_n79A-n257A	1A	CA_n79A-n257A
DC_1A_n79A-n257D	DC_1A_n79A DC_1A-n257A DC_1A_n79A-n257A	1A	CA_n79A-n257D
DC_1A_n79A-n257E	DC_1A_n79A DC_1A_n257A DC_1A_n79A-n257A	1A	CA_n79A-n257E
DC_1A_n79A-n257F	DC_1A_n79A DC_1A_n257A DC_1A_n79A-n257A	1A	CA_n79A-n257F
DC_1A_n79C-n257A	DC_1A_n79A DC_1A_n257A DC_1A_n79A-n257A	1A	CA_ n79C-n257A

EN-DC configuration	Uplink EN-DC configuration (NOTE 1)	E-UTRA configuration	NR configuration
DC_1A_n79C-n257D	DC_1A_n79A DC_1A_n257A DC_1A_n79A-n257A	1A	CA_ n79C-n257D
DC_1A_n79C-n257E	DC_1A_n79A DC_1A_n257A DC_1A_n79A-n257A	1A	CA_n79C-n257E
DC_1A_n79C-n257F	DC_1A_n79A DC_1A_n257A DC_1A_n79A-n257A	1A	CA_ n79C-n257F
DC_3A_n77A-n257A	DC_3A_n77A DC_3A_n257A DC_3A_n77A-n257A	3A	CA_n77A-n257A
DC_3A_n77A-n257D	DC_3A_n77A DC_3A_n257A DC_3A_n77A-n257A	3A	CA_n77A-n257D
DC_3A_n77A-n257E	DC_3A_n77A DC_3A_n257A DC_3A_n77A-n257A	3A	CA_n77A-n257E
DC_3A_n77A-n257F	DC_3A_n77A DC_3A_n257A DC_3A_n77A-n257A	3A	CA_n77A-n257F
DC_3A_n77C-n257A	DC_3A_n77A DC_3A_n257A DC_3A_n77A-n257A	3A	CA_n77C-n257A
DC_3A_n77C-n257D	DC_3A_n77A DC_3A_n257A DC_3A_n77A-n257A	3A	CA_n77C-n257D
DC_3A_n77C-n257E	DC_3A_n77A DC_3A_n257A DC_3A_n77A-n257A	3A	CA_n77C-n257E
DC_3A_n77C-n257F	DC_3A_n77A DC_3A_n257A DC_3A_n77A-n257A	3A	CA_n77C-n257F
DC_3A_n78A-n257A	DC_3A_n78A DC_3A_n257A DC_3A_n78A-n257A	3A	CA_n78A-n257A
DC_3A_n78A-n257D	DC_3A_n78A DC_3A_n257A DC_3A_n78A-n257A	3A	CA_n78A-n257D
DC_3A_n78A-n257E	DC_3A_n78A DC_3A_n257A DC_3A_n78A-n257A	3A	CA_n78A-n257E
DC_3A_n78A-n257F	DC_3A_n78A DC_3A_n257A DC_3A_n78A-n257A	3A	CA_n78A-n257F
DC_3A_n78C-n257A	DC_3A_n78A DC_3A_n257A DC_3A_n78A-n257A	3A	CA_n78C-n257A
DC_3A_n78C-n257D	DC_3A_n78A DC_3A_n257A DC_3A_n78A-n257A	3A	CA_n78C-n257D
DC_3A_n78C-n257E	DC_3A_n78A DC_3A_n257A DC_3A_n78A-n257A	3A	CA_n78C-n257E
DC_3A_n78C-n257F	DC_3A_n78A DC_3A_n257A DC_3A_n78A-n257A	3A	CA_n78C-n257F
DC_3A_n79A-n257A	DC_3A_n79A DC_3A_n257A DC_3A_n79A-n257A	3A	CA_n79A-n257A
DC_3A_n79A-n257D	DC_3A_n79A DC_3A_n257A DC_3A_n79A-n257A	3A	CA_n79A-n257D

EN-DC configuration	Uplink EN-DC configuration (NOTE 1)	E-UTRA configuration	NR configuration
DC_3A_n79A-n257E	DC_3A_n79A DC_3A_n257A DC_3A_n79A-n257A	3A	CA_n79A-n257E
DC_3A_n79A-n257F	DC_3A_n79A DC_3A_n257A DC_3A_n79A-n257A	3A	CA_n79A-n257F
DC_3A_n79C-n257A	DC_3A_n79A DC_3A_n257A DC_3A_n79A-n257A	3A	CA_n79C-n257A
DC_3A_n79C-n257D	DC_3A_n79A DC_3A_n257A DC_3A_n79A-n257A	3A	CA_n79C-n257D
DC_3A_n79C-n257E	DC_3A_n79A DC_3A_n257A DC_3A_n79A-n257A	3A	CA_n79C-n257E
DC_3A_n79C-n257F	DC_3A_n79A DC_3A_n257A DC_3A_n79A-n257A	3A	CA_n79C-n257F
DC_5A_n78A-n257A	DC_5A_n78A DC_5A_n257A	5A	CA_n78A-n257A
DC_7A_n78A-n257A	DC_7A_n78A DC_7A_n257A	7A	CA_n78A-n257A
DC_7A-7A_n78-n257A	DC_7A_n78A DC_7A_n257A DC_7A_n78A-n257A	CA_7A-7A	CA_n78A-n257A
DC_19A_n77A-n257A	DC_19A_n77A DC_19A_n257A DC_19A_n77A-n257A	19A	CA_n77A-n257A
DC_19A_n77A-n257D	DC_19A_n77A DC_19A_n257A DC_19A_n77A-n257A	19A	CA_n77A-n257D
DC_19A_n77A-n257E	DC_19A_n77A DC_19A_n257A DC_19A_n77A-n257A	19A	CA_n77A-n257E
DC_19A_n77A-n257F	DC_19A_n77A DC_19A_n257A DC_19A_n77A-n257A	19A	CA_n77A-n257F
DC_19A_n77C-n257A	DC_19A_n77A DC_19A_n257A DC_19A_n77A-n257A	19A	CA_n77C-n257A
DC_19A_n77C-n257D	DC_19A_n77A DC_19A_n257A DC_19A_n77A-n257A	19A	CA_n77C-n257D
DC_19A_n77C-n257E	DC_19A_n77A DC_19A_n257A DC_19A_n77A-n257A	19A	CA_n77C-n257E
DC_19A_n77C-n257F	DC_19A_n77A DC_19A_n257A DC_19A_n77A-n257A	19A	CA_n77C-n257F
DC_19A_n78A-n257A	DC_19A_n78A DC_19A_n257A DC_19A_n78A-n257A	19A	CA_n78A-n257A
DC_19A_n78A-n257D	DC_19A_n78A DC_19A_n257A DC_19A_n78A-n257A	19A	CA_n78A-n257D
DC_19A_n78A-n257E	DC_19A_n78A DC_19A_n257A DC_19A_n78A-n257A	19A	CA_n78A-n257E
DC_19A_n78A-n257F	DC_19A_n78A DC_19A_n257A DC_19A_n78A-n257A	19A	CA_n78A-n257F
DC_19A_n78C-n257A	DC_19A_n78A DC_19A_n257A DC_19A_n78A-n257A	19A	CA_n78C-n257A

EN-DC configuration	Uplink EN-DC configuration (NOTE 1)	E-UTRA configuration	NR configuration
DC_19A_n78C-n257D	DC_19A_n78A DC_19A_n257A DC_19A_n78A-n257A	19A	CA_n78C-n257D
DC_19A_n78C-n257E	DC_19A_n78A DC_19A_n257A DC_19A_n78A-n257A	19A	CA_ n78C-n257E
DC_19A_n78C-n257F	DC_19A_n78A DC_19A_n257A DC_19A_n78A-n257A	19A	CA_ n78C-n257F
DC_19A_n79A-n257A	DC_19A_n79A DC_19A_n257A DC_19A_n79A-n257A	19A	CA_n79A-n257A
DC_19A_n79A-n257D	DC_19A_n79A DC_19A_n257A DC_19A_n79A-n257A	19A	CA_n79A-n257D
DC_19A_n79A-n257E	DC_19A_n79A DC_19A_n257A DC_19A_n79A-n257A	19A	CA_n79A-n257E
DC_19A_n79A-n257F	DC_19A_n79A DC_19A_n257A DC_19A_n79A-n257A	19A	CA_n79A-n257F
DC_19A_n79C-n257A	DC_19A_n79A DC_19A_n257A DC_19A_n79A-n257A	19A	CA_n79C-n257A
DC_19A_n79C-n257D	DC_19A_n79A DC_19A_n257A DC_19A_n79A-n257A	19A	CA_n79C-n257D
DC_19A_n79C-n257E	DC_19A_n79A DC_19A_n257A DC_19A_n79A-n257A	19A	CA_n79C-n257E
DC_19A_n79C-n257F	DC_19A_n79A DC_19A_n257A DC_19A_n79A-n257A	19A	CA_n79C-n257F
DC_21A_n77A-n257A	DC_21A_n77A DC_21A_n257A	21A	CA_n77A-n257A
DC_21A_n78A-n257A	DC_21A_n78A DC_21A_n257A	21A	CA_n78A-n257A
DC_21A_n79A-n257A	DC_21A_n79A DC_21A_n257A	21A	CA_n79A-n257A
NOTE 1: Uplink CA configurations are the configurations supported by the present release of specifications.			

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)	E-UTRA configuration	NR configuration
DC_1A-3A_n78A-n257A	DC_1A_n78A DC_1A_n257A DC_3A_n78A DC_3A_n257A	CA_1A-3A	CA_n78A-n257A
DC_1A-5A_n78A-n257A	DC_1A_n78A DC_1A_n257A DC_5A_n78A DC_5A_n257A	CA_1A-5A	CA_n78A-n257A
DC_1A-7A-7A_n78A-n257A	DC_1A_n78A DC_1A_n257A DC_7A_n78A DC_7A_n257A	CA_1A-7A-7A	CA_n78A-n257A
DC_1A-7A_n78A-n257A	DC_1A_n78A DC_1A_n257A DC_7A_n78A DC_7A_n257A	CA_1A-7A	CA_n78A-n257A
DC_3A-5A_n78A-n257A	DC_3A_n78A DC_3A_n257A DC_5A_n78A DC_5A_n257A	CA_3A-5A	CA_n78A-n257A
DC_3A-7A-7A_n78A-n257A	DC_3A_n78A DC_3A_n257A DC_7A_n78A DC_7A_n257A	CA_3A-7A-7A	CA_n78A-n257A
DC_3A-7A_n78A-n257A	DC_3A_n78A DC_3A_n257A DC_7A_n78A DC_7A_n257A	CA_3A-7A	CA_n78A-n257A
DC_5A-7A-7A_n78A-n257A	DC_5A_n78A DC_5A_n257A DC_7A_n78A DC_7A_n257A	CA_5A-7A-7A	CA_n78A-n257A
DC_5A-7A_n78A-n257A	DC_5A_n78A DC_5A_n257A DC_7A_n78A DC_7A_n257A	CA_5A-7A	CA_n78A-n257A
NOTE 1: Uplink CA 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 including FR1 and FR2 configurations (five bands)

EN-DC configuration	Uplink EN-DC configuration (NOTE 1)	E-UTRA configuration	NR configuration
DC_1A-3A-5A_n78A-n257A	DC_1A_n78A DC_1A_n257A DC_3A_n78A DC_3A_n257A DC_5A_n78A DC_5A_n257A	CA_1A-3A-5A	CA_n78A-n257A
DC_1A-3A-7A-7A_n78A-n257A	DC_1A_n78A DC_1A_n257A DC_3A_n78A DC_3A_n257A DC_7A_n78A DC_7A_n257A	CA_1A-3A-7A-7A	CA_n78A-n257A
DC_1A-3A-7A_n78A-n257A	DC_1A_n78A DC_1A_n257A DC_3A_n78A DC_3A_n257A DC_7A_n78A DC_7A_n257A	CA_1A-3A-7A	CA_n78A-n257A
DC_1A-5A-7A-7A_n78A-n257A	DC_1A_n78A DC_1A_n257A DC_5A_n78A DC_5A_n257A DC_7A_n78A DC_7A_n257A	CA_1A-5A-7A-7A	CA_n78A-n257A
DC_1A-5A-7A_n78A-n257A	DC_1A_n78A DC_1A_n257A DC_5A_n78A DC_5A_n257A DC_7A_n78A DC_7A_n257A	CA_1A-5A-7A	CA_n78A-n257A
DC_3A-5A-7A-7A_n78A-n257A	DC_3A_n78A DC_3A_n257A DC_5A_n78A DC_5A_n257A DC_7A_n78A DC_7A_n257A	CA_3A-5A-7A-7A	CA_n78A-n257A
DC_3A-5A-7A_n78A-n257A	DC_3A_n78A DC_3A_n257A DC_5A_n78A DC_5A_n257A DC_7A_n78A DC_7A_n257A	CA_3A-5A-7A	CA_n78A-n257A

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)	E-UTRA configuration	NR configuration
DC_1A-3A-5A-7A_n78A-n257A	DC_1A_n78A DC_1A_n257A DC_3A_n78A DC_3A_n257A DC_5A_n78A DC_5A_n257A DC_7A_n78A DC_7A_n257A	CA_1A-3A-5A-7A	CA_n78A-n257A
NOTE 1: Uplink CA configurations are the configurations supported by the present release of specifications.			

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

5.5B.7.1 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	NR configuration for FR1	NR configuration for FR2
DC_n77A-n257A	DC_n77A-n257A	n77A	n257A
DC_n77A-n257D		n77A	CA_n257D
DC_n77A-n257E		n77A	CA_n257E
DC_n77A-n257F		n77A	CA_n257F
DC_n77A-n257G		n77A	CA_n257G
DC_n77A-n257H		n77A	CA_n257H
DC_n77A-n257I		n77A	CA_n257I
DC_n77A-n257J		n77A	CA_n257J
DC_n77A-n257K		n77A	CA_n257K
DC_n77A-n257L		n77A	CA_n257L
DC_n77A-n257M		n77A	CA_n257M
DC_n77C-n257A		CA_n77C	n257A
DC_n77C-n257D		CA_n77C	CA_n257D
DC_n77C-n257E		CA_n77C	CA_n257E
DC_n77C-n257F		CA_n77C	CA_n257F
DC_n78A-n257A	DC_n78A-n257A	n78A	n257A
DC_n78A-n257D		n78A	CA_n257D
DC_n78A-n257E		n78A	CA_n257E
DC_n78A-n257F		n78A	CA_n257F
DC_n78A-n257G		n78A	CA_n257G
DC_n78A-n257H		n78A	CA_n257H
DC_n78A-n257I		n78A	CA_n257I
DC_n78A-n257J		n78A	CA_n257J
DC_n78A-n257K		n78A	CA_n257K
DC_n78A-n257L		n78A	CA_n257L
DC_n78A-n257M		n78A	CA_n257M
DC_n78C-n257A		CA_n78C	n257A
DC_n78C-n257D		CA_n78C	CA_n257D
DC_n78C-n257E		CA_n78C	CA_n257E
DC_n78C-n257F		CA_n78C	CA_n257F
DC_n79A-n257A	DC_n79A-n257A	n79A	n257A
DC_n79A-n257D		n79A	CA_n257D
DC_n79A-n257E		n79A	CA_n257E
DC_n79A-n257F		n79A	CA_n257F
DC_n79A-n257G		n79A	CA_n257G
DC_n79A-n257H		n79A	CA_n257H
DC_n79A-n257I		n79A	CA_n257I
DC_n79A-n257J		n79A	CA_n257J
DC_n79A-n257K		n79A	CA_n257K
DC_n79A-n257L		n79A	CA_n257L
DC_n79A-n257M		n79A	CA_n257M
DC_n79C-n257A		n79C	n257A
DC_n79C-n257D		CA_n79C	CA_n257D
DC_n79C-n257E		CA_n79C	CA_n257E
DC_n79C-n257F		CA_n79C	CA_n257F
NOTE 1: NR configuration for FR1 and FR2 are defined in TS 38.521-1 [8] and TS 38.521-2 [9] respectively.			

6 Transmitter characteristics

6.1 General

Editor's Note: Test configurations/environments that require new spherical scan shall be included in test procedure section and identifying such scenarios is currently FFS and owned by RAN5.

For Tx test cases the identified beam peak direction can be stored and reused for a device under test in various configurations/environments for the full duration of device testing as long as beam peak direction is the same.

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 LTE connecting to the network by OTA without calibration.

Unless otherwise stated, requirements for NR transmitter written in TS 38.101-1 and TS 38.101-2 apply and are assumed anchor agnostic. Requirements are verified under conditions where anchor resources do not interfere NR operation.

Unless otherwise stated, Channel Bandwidth shall be prioritized in the selecting of test points. Subcarrier spacing shall be selected after Test Channel Bandwidth is selected.

6.2 Transmitter power

6.2A Transmitter power for CA without EN-DC

6.2A.1

6.2A.1.1 UE maximum output power for inter-band NR CA between FR 1 and FR 2 without EN-DC

FFS

6.2A.2

6.2A.2.1 UE maximum output power reduction for inter-band NR CA between FR 1 and FR 2 without EN-DC

FFS

6.2A.3

6.2A.3.1 UE additional maximum output power reduction for inter-band NR CA between FR 1 and FR 2 without EN-DC

FFS

6.2A.4

6.2A.4.1 UE Configured output power level for inter-band NR CA between FR 1 and FR 2 without EN-DC

FFS

6.2A.4.2 ΔTIB,c for CA

6.2A.4.2.1 ΔTIB,c for inter-band CA between FR 1 and FR 2

$\Delta T_{IB,c}$ for NR CA For the UE which supports inter-band NR CA configuration, $\Delta T_{IB,c}$ in Tables below applies. Unless otherwise stated, $\Delta T_{IB,c}$ is set to zero.

Table 6.2A.4.2.1-1: ΔTIB,c due to NR CA (two bands): FFS

Inter-band EN-DC configuration	NR Band	$\Delta T_{IB,c}$ (dB)

6.2B Transmitter power for EN-DC

6.2B.1 UE Maximum Output Power for EN-DC

FFS

6.2B.1.1 UE Maximum Output Power for Intra-Band Contiguous EN-DC

Editor's note: The following aspects are either missing or not yet determined:

- Message contents are incomplete.

- Test frequencies for intra-band contiguous EN-DC is TBD in 38.508.

6.2B.1.1.1 Test purpose

To verify that the error of the UE maximum output power does not exceed the range prescribed by the specified nominal maximum output power and tolerance.

An excess maximum output power has the possibility to interfere to other channels or other systems. A small maximum output power decreases the coverage area.

6.2B.1.1.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC operation on FR1.

NOTE: For the test for DC_(n)71AA and DC_(n)41AA, it is applicable to UE which supports dynmic power sharing.

6.2B.1.1.3 Minimum conformance requirements

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.1.1.3-1: Maximum output power for EN-DC (continuous sub-blocks)

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/-2[1]	23	+2/-2[1]
NOTE 1: If all transmitted resource blocks over all component carriers are confined within FUL_low and FUL_low + 4 MHz or/and FUL_high – 4 MHz and FUL_high, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB				

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 LTE UL/DL configuration is 0 or 6; or

- if the LTE UL/DL configuration is 1 and special subframe configuration is 0 or 5; or

- if the IE *p-maxUE-FR1* as defined in TS 38.331 [7] 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 sub-clause 6.2B.4;

- else

    - apply all requirements for the supported power class, and set the configured transmitted power class as specified in sub-clause 6.2B.4;

The normative reference for this requirement is TS 38.101-3 [4] clause 6.2B.1.

6.2B.1.1.4 Test description

6.2B.1.1.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2.All of these configurations shall be tested with applicable test parameters for each EN-DC configuration specified in clause 5.3B.1.2, and are shown in table 6.2B.1.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2 for E-UTRA RMC for TDD, TS 36.521-1 [10] Annex A.2 for E-UTRA RMC for FDD, and TS 38.521-1 [8] Annex A.2 for NR RMC. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 6.2B.1.1.4.1-1: Test configuration table

Initial Conditions					
Test Environment as specified in TS 38.508-1 [6] subclause 4.1		NC, TL/VL, TL/VH, TH/VL, TH/VH			
Test Frequencies as specified in TS 38.508-1 [6] subclause 4.3.1		Low range, Mid range, High range			
Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE		Lowest, Mid, Highest			
Test SCS for the NR cell as specified in TS 38.521-1 [8] Table 5.3.5-1		Lowest ,Highest			
Test Parameters					
Test Parameters					
Test ID	**Downlink Configuration**	**EN-DC Uplink Configuration**			
		E-UTRA Cell		**NR Cell**	
		Modulation	**RB allocation**	**Modulation(NOTE 2)**	**RB allocation(NOTE 1)**
1	N/A for MOP testing.	NOTE 3		DFT-s-OFDM PI/2 BPSK	Inner Full
2				DFT-s-OFDM PI/2 BPSK	Inner 1RB Left
3				DFT-s-OFDM PI/2 BPSK	Inner 1RB Right
4				DFT-s-OFDM QPSK	Inner Full
5				DFT-s-OFDM QPSK	Inner 1RB Left
6				DFT-s-OFDM QPSK	Inner 1RB Right
NOTE 1: The specific configuration of each RB allocation is defined in Table 6.1-1. NOTE 2: DFT-s-OFDM PI/2 BPSK test applies only for UEs which supports half Pi BPSK in FR1. NOTE 3: Modulation and RB allocation for E-UTRA Cell is selected from Table 6.2.2.4.1-1 in TS 36.521-1[10] as per the test channel bandwidth of E-UTRA cell.					

1. Connect the SS to the UE antenna connectors as shown in [6] TS 38.508-1 A.3.1.1 for SS diagram and A.3.2.1 for UE diagram.

2. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] subclause 4.4.3.

3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0 and TS 38.521-1 [8] Annex C.0 for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.

4. The UL Reference Measurement channels are TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.

5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.2B.1.1.4.3.

6.2B.1.1.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according to table 6.2B.1.1.4.1-1on E-UTRA CC and NR CC respectively. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

2. Send continuously uplink power control "up" commands to the UE for NR and E-UTRA carrier until the UE transmits at its P_{UMAX} level; allow at least 200 ms from the first TPC command for the UE to reach P_{UMAX} level for Power Class 3.

3. Measure the mean transmitted power over all EN-DC component carriers in the EN-DC, which shall meet the requirements described in table 6.2B.1.1.5-1 the period of the measurement shall be at least the continuous duration of one active sub-frame.

4. For UEs supporting Power Class 2, repeat steps 1~3 on the applicable bands except P_{UMAX} level in step 2 is corresponding to Power Class 2.

6.2B.1.1.4.3 Message contents

Message contents are according to TS 38.508-1 [6] subclause 4.6.1.

6.2B.1.1.5 Test requirements

The maximum output power for the DC configuration, derived in step 3 shall be within the range prescribed by the DC UE Power Class and tolerance in Table 6.2B.1.1.5-1.

Table 6.2B.1.1.5-1: Maximum output power for EN-DC (continuous sub-blocks) for power class 3

DC configuration	Power class2	Tolerance (dB)	Power class 3 (dBm)	Tolerance (dB)
DC_(n)71B			23	+2+TT/-3-TT
DC_(n)41AA			23	+2+TT/-2[1]+TT
NOTE 1: If all transmitted resource blocks over all component carriers are confined within FUL_low and FUL_low + 4 MHz or/and FUL_high – 4 MHz and FUL_high, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB NOTE 2: TT for each frequency and channel bandwidth is specified in TBD				

Table 6.2B.1.1.5-2: Maximum output power for EN-DC (continuous sub-blocks) for Power Class 2

DC configuration	Power class2	Tolerance (dB)	Power class 3 (dBm)	Tolerance (dB)
DC_(n)41AA	26	+2+TT/-2[1]-TT		
NOTE 1: If all transmitted resource blocks over all component carriers are confined within FUL_low and FUL_low + 4 MHz or/and FUL_high – 4 MHz and FUL_high, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB NOTE 2: TT for each frequency and channel bandwidth is specified in Table 6.2B.1.5-3				

Table 6.2B.1.5-3: Test Tolerance (UE maximum output power in case of no LTE+NR TX simultaneously)

	f ≤ 3.0GHz	3.0GHz < f ≤ 6GHz
BW ≤ 40MHz	0.7 dB	1.0 dB
40MHz < BW ≤ 100MHz	1.0 dB	1.0 dB

6.2B.1.2 UE Maximum Output Power for Intra-Band Non-Contiguous EN-DC

Editor's note: The following aspects are either missing or not yet determined:

- Message contents are incomplete: frame format configuration
- Test frequencies are not specifed for intra-band non-contiguous EN-DC in 38.508-1, pending on RAN4 for the Wgap.

6.2B.1.2.1 Test purpose

To verify that the error of the UE maximum output power does not exceed the range prescribed by the specified nominal maximum output power and tolerance.

An excess maximum output power has the possibility to interfere to other channels or other systems. A small maximum output power decreases the coverage area.

6.2B.1.2.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non contiguous EN-DC operationg on FR1.

NOTE: For the test for DC_41A_(n)41A, it is applicable to UE which supports dynmic power sharing.

6.2B.1.2.3 Minimum conformance requirements

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.1.2.3-1: Maximum output power for EN-DC (non-continuous sub-blocks)

DC configuration	Power class 2 (dBm)	Tolerance (dB)	Power class 3 (dBm)	Tolerance (dB)
DC_3A_n3A(2)			23	+2/-3
DC_41A_n41A	26	+2/-2[1]	23	+2/-2[1]
NOTE 1: If all transmitted resource blocks over all component carriers are confined within FUL_low and FUL_low + 4 MHz or/and FUL_high – 4 MHz and FUL_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				

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 LTE UL/DL configuration is 0 or 6; or

- if the LTE UL/DL configuration is 1 and special subframe configuration is 0 or 5; or

- if the IE *p-maxUE-FR1* as defined in TS 38.331 [7] 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 sub-clause 6.2B.4;

- else

- apply all requirements for the supported power class, and set the configured transmitted power class as specified in sub-clause 6.2B.4;

The normative reference for this requirement is TS 38.101-3 [4] clause 6.2B.1.

6.2B.1.2.4 Test description

6.2B.1.2.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in Table 5.3B.1.3-1, channel bandwidths and sub-carrier spacings for the NR cell are specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2 .All of these configurations shall be tested with applicable test parameters for each EN-DC configuration specified in Table 5.3B.1.3-1, and are shown in table 6.2B.1.2.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2.for E-UTRA RMC for TDD, TS 36.521-1 [10] Annex A.2 for E-UTRA RMC for FDD, and TS 38.521-1 [8] Annex A.2 for NR RMC Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 6.2B.1.2.4.1-1: Test configuration table

Initial Conditions					
Test Environment as specified in TS 38.508-1 [6] subclause 4.1		NC, TL/VL, TL/VH, TH/VL, TH/VH			
Test Frequencies as specified in TS 38.508-1 [6] subclause 4.3.1		MaxWgap			
Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE		Lowest, Mid, Highest			
Test SCS for the NR cell as specified in TS 38.521-1 [8] Table 5.3.5-1		Lowest, Highest			
Test Parameters					
Test ID	**Downlink Configuration**	**EN-DC Uplink Configuration**			
		E-UTRA Cell		**NR Cell**	
		Modulation	**RB allocation**	**Modulation(NOTE 2)**	**RB allocation(NOTE 1)**
1	N/A for MOP testing.	NOTE 3		DFT-s-OFDM PI/2 BPSK	Inner Full
2				DFT-s-OFDM PI/2 BPSK	Inner 1RB Left
3				DFT-s-OFDM PI/2 BPSK	Inner 1RB Right
4				DFT-s-OFDM QPSK	Inner Full
5				DFT-s-OFDM QPSK	Inner 1RB Left
6				DFT-s-OFDM QPSK	Inner 1RB Right
NOTE 1: The specific configuration of each RB allocation is defined in Table 6.1-1. NOTE 2: DFT-s-OFDM PI/2 BPSK test applies only for UEs which supports half Pi BPSK in FR1. NOTE 3: Modulation and RB allocation for E-UTRA Cell is selected from Table 6.2.2.4.1-1 in TS 36.521-1[10] as per the test channel bandwidth of E-UTRA cell.					

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [6] A.3.1.1 for SS diagram and A.3.2.1 for UE diagram.

2. The parameter settings for the cell are set up according to TS 38.508-1 [6] subclause 4.4.3.

3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0 and TS 38.521-1 [8] Annex C.0 for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.

4. The UL Reference Measurement channels are TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.

5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.2B.1.2.4.3.

6.2B.1.2.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according to table 6.2B.1.2.4.1-1on E-UTRA CC and NR CC respectively. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

2. Send continuously uplink power control "up" commands to the UE for NR and E-UTRA carrier according to table 6.2B.1.2.4.1-1 until the UE transmits at its P_{UMAX} level; allow at least 200 ms from the first TPC command for the UE to reach P_{UMAX} level for Power class 2.

3. Measure the mean transmitted power over all EN-DC component carriers in the EN-DC, which shall meet the requirements described in table 6.2B.1.2.5-1 the period of the measurement shall be at least the continuous duration of one active sub-frame.

4. For UEs supporting Power Class 2, repeat steps 1~3 on the applicable bands except P_{UMAX} level in step 2 is corresponding to Power Class 2.

6.2B.1.2.4.3 Message contents

Message contents are according to TS 38.508-1 [6] subclause 4.6.1[FFS]

6.2B.1.2.5 Test requirements

The maximum output power for the DC configuration, derived in step 3 shall be within the range prescribed by the DC UE Power Class and tolerance in Table 6.2B.1.2.5-1.

Table 6.2B.1.2.5-1: Maximum output power for EN-DC (non-continuous sub-blocks) for power class 3

DC configuration	Power class 2 (dBm)	Tolerance (dB)	Power class 3 (dBm)	Tolerance (dB)
DC_3A_n3A(2)			23	+2+TT/-3-TT
DC_41A_n41A			23	+2/-2[1]
NOTE 1: If all transmitted resource blocks over all component carriers are confined within FUL_low and FUL_low + 4 MHz or/and FUL_high – 4 MHz and FUL_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: TT for frequency and channel bandwidth is Table 6.2B.1.2.5-3				

Table 6.2B.1.2.5-2: Maximum output power for EN-DC (non-continuous sub-blocks) for power class 2

DC configuration	Power class 2 (dBm)	Tolerance (dB)	Power class 3 (dBm)	Tolerance (dB)
DC_41A_n41A	26	+2+TT/-2[1]-TT		
NOTE 1: If all transmitted resource blocks over all component carriers are confined within FUL_low and FUL_low + 4 MHz or/and FUL_high – 4 MHz and FUL_high, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB NOTE 2: TT for frequency and channel bandwidth is Table 6.2B.1.2.5-3				

Table 6.2B.1.2.5-3: Test Tolerance (UE maximum output power in case of no LTE + NR TX simultaneously)

	f ≤ 3.0GHz	3.0GHz < f ≤ 6GHz
BW ≤ 40MHz	0.7 dB	1.0 dB
40MHz < BW ≤ 100MHz	1.0 dB	1.0 dB

6.2B.1.3 UE Maximum Output Power for Inter-Band EN-DC within FR1

Editor’s note: The following aspects are either missing or not yet determined:

- Message contents are incomplete: power control and frame format configuration

- Test procedure for LTE+TX simultaneously is FFS.

- The inter-band EN-DC with FR1 with multiple LTE CCs is FFS.

- Test tolerence for test requirements in case of LTE+NR TX simultaneously is TBD.

6.2B.1.3.1 Test purpose

To verify that the error of the UE maximum output power does not exceed the range prescribed by the specified nominal maximum output power and tolerance.

An excess maximum output power has the possibility to interfere to other channels or other systems. A small maximum output power decreases the coverage area.

6.2B.1.3.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC operating on FR1.

6.2B.1.3.3 Minimum conformance requirements

For inter-band EN-DC of LTE 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.1.3.3-1: 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 DC_1A_n84A_ULSUP-TDM_n78A DC_1A_n84A_ULSUP-FDM_n78A	23	+2/-3
DC_1A_n79A	23	+2/-3
DC_2A_n5A	23	+2/-3[1]
DC_2A_n66A	23	+2/-3[1]
DC_2A_n71A	23	+2/-3
DC_2A_n78A	23	+2/-3
DC_3A_n7A	23	+2/-3[1]
DC_3A_n28A	23	+2/-3[1]
DC_3A_n40A	23	+2/-3[1]
DC_3A_n51A	23	+2/-3[1]
DC_3A_n77A	23	+2/-3[1]
DC_3A_n78A DC_3A_n80A_ULSUP-TDM_n78A, DC_3A_n80A_ULSUP-FDM_n78A	23	+2/-3[1]
DC_3A_n79A DC_3A_n80A_ULSUP-TDM_n79A, DC_3A_n80A_ULSUP-FDM_n79A	23	+2/-3[1]
DC_3A_n82A	23	+2/-3[1]
DC_5A_n40A	23	+2/-3[1]
DC_5A_n66A	23	+2/-3[1]
DC_5A_n78A	23	+2/-3
DC_7A_n28A	23	+2/-3[1]
DC_7A_n51A	23	+2/-3[1]
DC_7A_n78A DC_7C_n78A	23	+2/-3
DC_8A_n40A	23	+2/-3[1]
DC_8A_n77A	23	+2/-3
DC_8A_n78A DC_8A_n81A_ULSUP-TDM_n78A, DC_8A_n81A_ULSUP-FDM_n78A	23	+2/-3
DC_8A_n79A DC_8A_n81A_ULSUP-TDM_n79A, DC_8A_n81A_ULSUP-FDM_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

EN-DC configuration	Power class 3 (dBm)	Tolerance (dB)
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 DC_20A_n83A	23	+2/-3
DC_20A_n51A	23	+2/-3
DC_20A_n77A	23	+2/-3
DC_20A_n78A DC_20A_n82A_ULSUP-TDM_n78A, DC_20A_n82A_ULSUP-FDM_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 DC_28A_n83A_ULSUP-TDM_n78A, DC_28A_n83A_ULSUP-FDM_n78A	23	+2/-3
DC_28A_n79A	23	+2/-3
DC_30A_n5A	23	+2/-3
DC_30A_n66A	23	+2/-3
DC_38A_n78A	N/A	N/A
DC_39A_n78A	23	+2/-3[1]
DC_39A_n79A	23	+2/-3[1]
DC_40A_n77A	N/A	N/A
DC_41A_n77A DC_41C_n77A	23	+2/-3[1]
DC_41A_n78A DC_41C_n78A	23	+2/-3[1]
DC_41A_n79A DC_41C_n79A	23	+2/-3[1]
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[1]
DC_66A_n71A	23	+2/-3

EN-DC configuration	Power class 3 (dBm)	Tolerance (dB)
DC_66A_n78A, DC_66A_n86A_ULSUP-TDM_n78A, DC_66A_n86A_ULSUP-FDM_n78A	23	+2/-3
NOTE 1: [2] refers to 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).		

The normative reference for this requirement is TS 38.101-3 [4] clause 6.2B.1.

LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

6.2B.1.3.4 Test description

6.2B.1.3.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, DC configuration specified in clause 5.5B.4 and test channel bandwidths specified in [TBD], and sub-carrier spacing based on NR operating bands specified in TS 38.521-1 [8] clause 5.3 .All of these configurations shall be tested with applicable test parameters for each EN-DC configuration, and are shown in table 6.2B.1.3.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A.2 for E-UTRA RMC for TDD, TS 36.521-1 [10] Annex A.2 for E-UTRA RMC for FDD , and TS 38.521-1 [8] Annex A.2 for NR RMC. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 6.2B.1.3.4.1-1: Test configuration table for for NR, LTE TX seperately

Initial Conditions								
Test Environment as specified in TS 38.508-1 [6] subclause 4.1					NC, TL/VL, TL/VH, TH/VL, TH/VH			
Test Frequencies as specified in TS 38.508-1 [6] subclause 4.3.1					Low for E-UTRA CC1 and NR CC1, Mid for E-UTRA CC1 and NR CC1, High for E-UTRA CC1 and NR CC1			
Test EN_DC bandwidth combinations as specified in [TBD]					5MHz for E-UTRA CC1 and Lowest for NR CC1, Highest for E-UTRA CC1 and Highest for NR CC1			
Test SCS for the NR cell as specified in TS 38.521-1 [8] Table 5.3.5-1					Lowest, Highest			
Test Parameters								
Test ID	**Test Freq**	**E-UTRA BW**	**NR BW**	**Downlink Configuration**	**EN-DC Uplink Configuration**			
					E-UTRA Cell		**NR Cell**	
					Modulation	**RB allocation (Note 2)**	**Modulation**	**RB allocation (Note 3)**
1	High	5	Default	N/A	QPSK	Outer_1RB_Right	N/A	0
2	Low	5	Default		QPSK	Outer_1RB_Left	N/A	0
3	Default	5	Default		QPSK	8	N/A	0
4	Default	5	Default		N/A	0	DFT-s-OFDM PI/2 BPSK	Inner_Full
5	High	5	Default		N/A	0	DFT-s-OFDM PI/2 BPSK	Edge_1RB _Right
6	Low	5	Default		N/A	0	DFT-s-OFDM PI/2 BPSK	Edge_1RB _Left
7	Default	5	Default		N/A	0	DFT-s-OFDM QPSK	Inner_Full
8	High	5	Default		N/A	0	DFT-s-OFDM QPSK	Edge_1RB Right
9	Low	5	Default		N/A	0	DFT-s-OFDM QPSK	Edeg_1RB Left
10	High	10	Default		QPSK	Outer_1RB_Right	N/A	0
11	Low	10	Default		QPSK	Outer_1RB_Left	N/A	0
12	Default	10	Default		QPSK	12	N/A	0
13	Default	10	Default		N/A	0	DFT-s-OFDM PI/2 BPSK	Inner_Full
14	High	10	Default		N/A	0	DFT-s-OFDM PI/2 BPSK	Edge_1RB Rgiht
15	Low	10	Default		N/A	0	DFT-s-OFDM PI/2 BPSK	Edge_1RB Left
16	Default	10	Default		N/A	0	DFT-s-OFDM QPSK	Inner_Full
17	High	10	Default		N/A	0	DFT-s-OFDM QPSK	Edge_1RB_Right
18	Low	10	Default		N/A	0	DFT-s-OFDM QPSK	Edge_1RB_Left
19	High	15	Default		QPSK	Outer_1RB_Right	N/A	0
20	Low				QPSK	Outer_1RB_Left		

21	Default	15	Default		QPSK	16	N/A	0
22	Default	15	Default		N/A	0	DFT-s-OFDM PI/2 BPSK	Inner_Full
23	High	15	Default		N/A	0	DFT-s-OFDM PI/2 BPSK	Edge_1RB_Right
24	Low	15	Default		N/A	0	DFT-s-OFDM PI/2 BPSK	Inner 1RB_Left
25	Default	15	Default		N/A	0	DFT-s-OFDM QPSK	Inner_Full
26	High	15	Default		N/A	0	DFT-s-OFDM QPSK	Edge_1RB_Rgiht
27	Low	15	Default		N/A	0	DFT-s-OFDM QPSK	Edge_1RB_Left
28	High	20	Default		QPSK	Outer_1RB_Right	N/A	0
29	Low				QPSK	Outer_1RB_Left	N/A	0
30	Default	20	Default		QPSK	18	N/A	0
31	Default	20	Default		N/A	0	DFT-s-OFDM PI/2 BPSK	Inner_Full
32	High	20	Default		N/A	0	DFT-s-OFDM PI/2 BPSK	Edge_1RB_Right
33	Low	20	Default		N/A	0	DFT-s-OFDM PI/2 BPSK	Edge_1RB_Left
34	Default	20	Default		N/A	0	DFT-s-OFDM QPSK	Inner_Full
35	High	20	Default		N/A	0	DFT-s-OFDM QPSK	Edge_1RB_Right
36	Low	20	Default		N/A	0	DFT-s-OFDM QPSK	Edge_1RB_Low
NOTE 1: For non-1RB allocatio on E-UTRA bands, the RBstart shall be RB #0 for low and mid range, and RB# (max +1 - RB allocation) for high range test frequency. NOTE 2: The specific configuration of each RB allocation is defined in Table 6.1-1 in TS 38.521-1 [8]. NOTE 3: Outer_1RB_Left defined as 1 RB allocated at the left edge of the E-UTRA component. Outer_1RB_Right defined as 1 RB allocated at the right edge of the E-UTRA component.								

Table 6.2B.1.3.4.1-2: Test configuration table for NR+LTE TX simultaneously

Initial Conditions	
Test Environment as specified in TS 38.508-1 [6] subclause 4.1	NC, TL/VL, TL/VH, TH/VL, TH/VH
Test Frequencies as specified in TS 38.508-1 [6] subclause 4.3.1	Low for E-UTRA CC1 and NR CC1, Mid for E-UTRA CC1 and NR CC1, High for E-UTRA CC1 and NR CC1
Test Channel Bandwidths as specified in TS 38.508-1 [6] subclause 4.3.1	5MHz for E-UTRA CC1 and Lowest for NR CC1, Highest for E-UTRA CC1 and Highest for NR CC1
Test SCS as specified in 38.521-1 [8] Table 5.3.5-1	Lowest, Highest
Test Parameters	

Test ID	Test Freq	E-UTRA BW	NR BW	Downlink Configuration	EN-DC Uplink Configuration			
					E-UTRA Cell		NR Cell	
					Modulation	RB allocation (Note 1)	Modulation	RB allocation (Note 2)
1	High	5	Default	N/A	QPSK	Outer_1RB_Right	DFT-s-OFDM PI/2 BPSK	Edge_1RB _Right
2	Low	5	Default		QPSK	Outer_1RB_Left	DFT-s-OFDM PI/2 BPSK	Edge_1RB _Left
3	Default	5	Default		QPSK	8	DFT-s-OFDM PI/2 BPSK	Inner_Full
4	High	5	Default		QPSK	Outer_1RB_Right	DFT-s-OFDM QPSK	Edge_1RB _Right
7	Low	5	Default		QPSK	Outer_1RB_Left	DFT-s-OFDM QPSK	Edge_1RB _Left
8	Default	5	Default		QPSK	8	DFT-s-OFDM QPSK	Inner_Full
10	High	10	Default		QPSK	Outer_1RB_Right	DFT-s-OFDM PI/2 BPSK	Edge_1RB _Right
11	Low	10	Default		QPSK	Outer_1RB_Left	DFT-s-OFDM PI/2 BPSK	Edge_1RB _Left
12	Default	10	Default		QPSK	12	DFT-s-OFDM PI/2 BPSK	Inner_Full
13	High	10	Default		QPSK	Outer_1RB_Right	DFT-s-OFDM QPSK	Edge_1RB _Right
14	Low	10	Default		QPSK	Outer_1RB_Left	DFT-s-OFDM QPSK	Edge_1RB _Left
15	Default	10	Default		QPSK	12	DFT-s-OFDM QPSK	Inner_Full
19	High	15	Default		QPSK	Outer_1RB_Right	DFT-s-OFDM PI/2 BPSK	Edge_1RB _Right
20	Low	15	Default		QPSK	Outer_1RB_Left	DFT-s-OFDM PI/2 BPSK	Edge_1RB _Left

21	Default	15	Default		QPSK	16	DFT-s-OFDM PI/2 BPSK	Inner_Full
25	High	15	Default		QPSK	Outer_1RB_Right	DFT-s-OFDM QPSK	Edge_1RB _Right
26	Low	15	Default		QPSK	Outer_1RB_Left	DFT-s-OFDM QPSK	Edge_1RB _Left
27	Default	15	Default		QPSK	16	DFT-s-OFDM QPSK	Inner_Full
28	High	20	Default		QPSK	Outer_1RB_Right	DFT-s-OFDM PI/2 BPSK	Edge_1RB_Right
29	Low	20	Default		QPSK	Outer_1RB_Left	DFT-s-OFDM PI/2 BPSK	Edge_1RB_Left
30	Default	20	Default		QPSK	18	DFT-s-OFDM PI/2 BPSK	Inner_Full
34	High	20	Default		QPSK	Outer_1RB_Right	DFT-s-OFDM QPSK	Edge_1RB_Right
35	Low	20	Default		QPSK	Outer_1RB_Left	DFT-s-OFDM QPSK	Edge_1RB_Left
36	Default	20	Default		QPSK	18	DFT-s-OFDM QPSK	Inner_Full
NOTE 1: For non-1RB allocatio on E-UTRA bands, the RBstart shall be RB #0 for low and mid range, and RB# (max +1 - RB allocation) for high range test frequency. NOTE 2: The specific configuration of each RB allocation is defined in Table 6.1-1 in TS 38.521-1 [8]. NOTE 3: Outer_1RB_Left defined as 1 RB allocated at the left edge of the E-UTRA component. Outer_1RB_Right defined as 1 RB allocated at the right edge of the E-UTRA component.								

1. Connect the SS to the UE antenna connectors as shown in [6] TS 38.508-1 A.3.1.1 for SS and A.3.2.1 for UE.

2. The parameter settings for the cell are set up according to TS 38.508-1 [6] subclause 4.4.3.

3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0 and TS 38.521-1 [8] Annex C.0 for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.

4. The UL Reference Measurement channels are TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.

5. Propagation conditions are set according to TS 36.521-1 [10] and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.2B.1.3.4.3.

6.2B.1.3.3.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according to table 6.2B.1.3.4.1-1on E-UTRA CC and NR CC respectively. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

2. Send continuously uplink power control "up" commands to the UE for NR and E-UTRA carrier until the UE transmits at its P_{UMAX} level; allow at least 200 ms for the UE to reach P_{UMAX} level.

3. Measure the mean transmitted power over all EN-DC component carriers in the EN-DC, which shall meet the requirements described in table 6.2B.1.3.5-1 the period of the measurement shall be at least the continuous duration of one active sub-frame.

For inter-band EN-DC band combination for which UE supports dynamic power sharing, additonal test points in case of NR+LTE TX simultaneously are tested as the following steps.

[FFS]

6.2B.1.3.4.3 Message contents

Message contents are according to TS 38.508-1 [6] subclause 4.6.1. [FFS]

6.2B.1.3.5 Test requirements

The maximum output power for the DC configuration, derived in step 3 shall be within the range prescribed by the UE Power Class and tolerance in Table 6.2B.1.3.5-1.

Table 6.2B.1.3.5-1: Maximum output power for inter-band EN-DC (two bands)

EN-DC configuration	Power class 3 (dBm)	Tolerance (dB)
DC_1A_n28A	23	+2 +TT/-3+TT
DC_1A_n40A	23	+2 +TT/-3+TT
DC_1A_n51A	23	+2 +TT/-3+TT
DC_1A_n77A	23	+2 +TT/-3+TT
DC_1A_n78A DC_1A_n84A_ULSUP-TDM_n78A DC_1A_n84A_ULSUP-FDM_n78A	23	+2 +TT/-3+TT
DC_1A_n79A	23	+2 +TT/-3+TT
DC_2A_n5A	23	+2 +TT/-3+TT
DC_2A_n66A	23	+2 +TT/-3+TT
DC_2A_n71A	23	+2 +TT/-3+TT
DC_2A_n78A	23	+2 +TT/-3+TT
DC_3A_n7A	23	+2 +TT/-3+TT
DC_3A_n28A	23	+2 +TT/-3+TT
DC_3A_n40A	23	+2 +TT/-3+TT
DC_3A_n51A	23	+2 +TT/-3+TT
DC_3A_n77A	23	+2 +TT/-3+TT
DC_3A_n78A DC_3A_n80A_ULSUP-TDM_n78A, DC_3A_n80A_ULSUP-FDM_n78A	23	+2 +TT/-3+TT
DC_3A_n79A DC_3A_n80A_ULSUP-TDM_n79A, DC_3A_n80A_ULSUP-FDM_n79A	23	+2 +TT/-3+TT
DC_3A_n82A	23	+2 +TT/-3+TT
DC_5A_n40A	23	+2 +TT/-3+TT
DC_5A_n66A	23	+2 +TT/-3+TT
DC_5A_n78A	23	+2 +TT/-3+TT
DC_7A_n28A	23	+2 +TT/-3+TT
DC_7A_n51A	23	+2 +TT/-3+TT
DC_7A_n78A	23	+2 +TT/-3+TT
DC_8A_n40A	23	+2 +TT/-3+TT
DC_8A_n77A	23	+2 +TT/-3+TT
DC_8A_n78A DC_8A_n81A_ULSUP-TDM_n78A, DC_8A_n81A_ULSUP-FDM_n78A	23	+2 +TT/-3+TT
DC_8A_n79A DC_8A_n81A_ULSUP-TDM_n79A, DC_8A_n81A_ULSUP-FDM_n79A	23	+2 +TT/-3+TT
DC_11A_n77A	23	+2 +TT/-3+TT
DC_11A_n78A	23	+2 +TT/-3+TT
DC_11A_n79A	23	+2 +TT/-3+TT
DC_12A_n5A	23	+2 +TT/-3+TT
DC_12A_n66A	23	+2 +TT/-3+TT

EN-DC configuration	Power class 3 (dBm)	Tolerance (dB)
DC_18A_n77A	23	+2 +TT/-3+TT
DC_18A_n78A	23	+2 +TT/-3+TT
DC_18A_n79A	23	+2 +TT/-3+TT
DC_19A_n77A	23	+2 +TT/-3+TT
DC_19A_n78A	23	+2 +TT/-3+TT
DC_19A_n79A	23	+2 +TT/-3+TT
DC_20A_n8A	23	+2 +TT/-3+TT
DC_20A_n28A DC_20A_n83A	23	+2 +TT/-3+TT
DC_20A_n51A	23	+2 +TT/-3+TT
DC_20A_n77A	23	+2 +TT/-3+TT
DC_20A_n78A DC_20A_n82A_ULSUP-TDM_n78A, DC_20A_n82A_ULSUP-FDM_n78A	23	+2 +TT/-3+TT
DC_21A_n77A	23	+2 +TT/-3+TT
DC_21A_n78A	23	+2 +TT/-3+TT
DC_21A_n79A	23	+2 +TT/-3+TT
DC_25A_n41A	23	+2 +TT/-3+TT
DC_26A_n41A	23	+2 +TT/-3+TT
DC_26A_n77A	23	+2 +TT/-3+TT
DC_26A_n78A	23	+2 +TT/-3+TT
DC_26A_n79A	23	+2 +TT/-3+TT
DC_28A n51A	23	+2 +TT/-3+TT
DC_28A_n77A	23	+2 +TT/-3+TT
DC_28A_n78A DC_28A_n83A_ULSUP-TDM_n78A, DC_28A_n83A_ULSUP-FDM_n78A	23	+2 +TT/-3+TT
DC_28A_n79A	23	+2 +TT/-3+TT
DC_30A_n5A	23	+2 +TT/-3+TT
DC_30A_n66A	23	+2 +TT/-3+TT
DC_38A_n78A	N/A	N/A
DC_39A_n78A	23	+2 +TT/-3+TT
DC_39A_n79A	23	+2 +TT/-3+TT
DC_40A_n77A	N/A	N/A
DC_41A_n77A	23	+2 +TT/-3+TT
DC_41A_n78A	23	+2 +TT/-3+TT
DC_41A_n79A	23	+2 +TT/-3+TT
DC_42A_n51A	23	+2 +TT/-3+TT
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 +TT/-3+TT
DC_66A_n71A	23	+2 +TT/-3+TT

EN-DC configuration	Power class 3 (dBm)	Tolerance (dB)
DC_66A_n78A, DC_66A_n86A_ULSUP-TDM_n78A, DC_66A_n86A_ULSUP-FDM_n78A	23	+2 +TT/-3+TT
NOTE 1: TT for each frequency and channel bandwidth is specified in Table 6.2B.1.3.5-2.		

Table 6.2B.1.3.5-2: Test Tolerance for UE maximum output power (LTE, NR TX seperately)

Uplink TX		f ≤ 3.0GHz	3.0GHz < f ≤ 4.2GHz	4.2GHz < f ≤ 6GHz
LTE	BW ≤ 20MHz	0.7	1.0	1.3
NR	BW ≤ 40MHz	0.7 dB	1.0 dB	1.0
	40MHz < BW ≤ 100MHz	1.0 dB	1.0 dB	1.0

6.2B.1.4 UE Maximum Output Power for Inter-Band EN-DC including FR2

6.2B.1.4.1 UE maximum output power - EIRP and TRP

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- All clauses related to Power class 3 can be tested using working assumptions of MU/TT
- The referred test case 6.2.1.1 in TS 38.521-2 is incomplete.
- Measurement Uncertainties and Test Tolerances are FFS for power class 1, 2 and 4.
- The following aspects of the clause are for future consideration:
    - Test Procedures for EIRP beam peak Extreme Conditions are FFS

6.2B.1.4.1.1 Test purpose

Same test purpose as in clause 6.2.1.1.1 in TS 38.521-2 [9] for the *NR* carrier.

6.2B.1.4.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2.

6.2B.1.4.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.2.1.1.3 in TS 38.521-2 [9] for the *NR* carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 subclause 6.2B.1.4.

6.2B.1.4.1.4 Test description

Same test description as in clause 6.2.1.1.4 in TS 38.521-2 [9] for the *NR* carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For initial conditions as in clause 6.2.1.1.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1 The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1 The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS36.521-1 [10].

Step 6 of Initial conditions as in clause 6.2.1.1.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.2.1.1.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.2B.1.4.1.5 Test requirement

Same test requirement as in clause 6.2.1.1.5 in TS 38.521-2 [9] for the *NR* carrier.

6.2B.1.4.2 UE maximum output power - Spherical coverage

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- All clauses related to Power class 3 can be tested using working assumptions of MU/TT
- The referred test case 6.2.1.2 in TS 38.521-2 is incomplete.
- Measurement Uncertainties and Test Tolerances are FFS for power class 1, 2 and 4.

6.2B.1.4.2.1 Test purpose

Same test purpose as in clause 6.2.1.2.1 in TS 38.521-2 [9] for the *NR* carrier.

6.2B.1.4.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC.

6.2B.1.4.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.2.1.2.3 in TS 38.521-2 [9] for the *NR* carrier.

The normative reference for this requirement is TS 38.101-3 subclause 6.2B.1.4.

6.2B.1.4.2.4 Test description

Same test description as in clause 6.2.1.2.4 in TS 38.521-2 [9] for the *NR* carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1.

For initial conditions as in clause 6.2.1.2.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1 The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1 The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS36.521-1 [10].

Step 6 of initial conditions as in clause 6.2.1.2.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.2.1.2.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.2B.1.4.2.5 Test requirement

Same test requirement as in clause 6.2.1.2.5 in TS 38.521-2 [9] for the *NR* carrier.

6.2B.2 UE Maximum Output Power reduction for EN-DC

6.2B.2.1 UE Maximum Output Power reduction for Intra-Band Contiguous EN-DC

6.2B.2.1.1 Test purpose

Same test purpose as in clause 6.2.2.1 in TS 38.521-1 [8] for the NR carrier.

6.2B.2.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band EN-DC and dynamic power sharing.

6.2B.2.1.3 Minimum conformance requirements

For intra-band contiguous EN-DC, single carrier UE maximum output power reduction specified in TS 36.101 [4] for E-UTRA and TS 38.101-1 [2] for NR apply for E-UTRA and NR carriers respectively, unless additional MPR is specified in 6.2B.3.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.2B.2.1.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.2B.2.1.4 Test description

6.2B.2.1.4.1 Initial conditions

Same test description as in clause 6.2.2.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1. For initial conditions as in clause 6.2.2.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1[10].

Same initial conditions as in clause 6.2.2.4.1 in TS 38.521-1 [8] with the following steps exception:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508 [6] clause 4.5.

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Same test procedure as in clause 6.2.2.4.2 in TS 38.521-1 [8] with the following steps exception:

3. Measure the mean power of the UE in the channel bandwidth of the radio access mode according to the test configuration. The period of the measurement shall be at least the continuous duration of one active sub-frame (1ms) and in the uplink symbols. For TDD slots with transient periods are not under test.

6.2B.2.1.4.3 Message contents

Message contents are according to TS 38.508-1 [6] subclause 4.6.1.

6.2B.2.1.5 Test requirement

The maximum output power, derived in step 3 shall be within the range prescribed by the nominal maximum output power and tolerance in table 6.2.2.5-1 and Table 6.2.2.5-4 in TS 38.521-1 [8].

6.2B.2.2 UE Maximum Output Power reduction for Intra-Band Non-Contiguous EN-DC

Editor's note: The following aspects are either missing or not yet determined:

- Initial condition is not complete.

- Equations for <Pcmax> is missing in TS 38.521-3, 6.2B.4.1.2

- Test requirement is TBD

- Test tolerance is not complete.

- Wgap not defined

6.2B.2.2.1 Test purpose

FFS

6.2B.2.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band EN-DC.

6.2B.2.2.3 Minimum conformance requirements

For intra-band non-contiguous EN-DC, single carrier UE maximum output power reduction specified in TS 36.101 [4] for E-UTRA and TS 38.101-1 [2] for NR apply for E-UTRA and NR carriers respectively, unless additional MPR is specified in 6.2B.3.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.2B.2.2.

6.2B.2.2.4 Test description

6.2B.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and test channel bandwidths based on NR operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC combination of test channel bandwidth and sub-carrier spacing, and are shown in table 6.2B.2.2.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521.1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 6.2B.2.2.4.1-1: Test configuration table

FFS

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [6], Figure A.3.1.1.1 for SS diagram and section A.3.2.1 for UE diagram.

2. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] subclause 4.4.3.

3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0 and TS 38.521-1 [8] Annex C.0 for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.

4. The UL Reference Measurement channels are TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.

5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.2B.2.2.4.3.

6.2B.2.2.4.2 Test procedure

1. NR SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format [0_1] for C_RNTI to schedule the UL RMC according to Table 6.2.2.4.1-1 and Table 6.2.2.4.1-2 of TS 38.521-1[8] for UE power class 3 and UE power class 2 respectively. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

2. E-UTRA SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.2.3.3-1 and Table 6.2.3_1.3-1 of TS 36.521-1[10] for UE power class 3 and UE power class 2 respectively. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

3. Send continuously uplink power control "up" commands to the UE for NR and E-UTRA carrier until the UE transmits at its P_{UMAX} level; allow at least 200 ms for the UE to reach P_{UMAX} level.

4. Measure the mean power over all component carriers for the EN-DC configuration, which shall meet the requirements described in table 6.2B.2.2.5-1. The period of the measurement shall be at least the continuous duration of [one active sub-frame].

NOTE 1: When switching to DFT-s-OFDM waveform, as specified in the test configuration table 6.5B.2.1.2.4.1-1 and 6.5B.2.1.2.4.1-2, send an RRCConnectionReconfiguration message containing NR RRCReconfiguration message according to TS 38.508-1 [6] clause 4.6.3 Table 4.6.3-118 PUSCH-Config without CP-OFDM condition. When switching to CP-OFDM waveform, send an RRCConnectionReconfiguration message containing NR RRCReconfiguration message with CP-OFDM condition.

6.2B.2.2.4.3 Message contents

Message contents are according to TS 38.508-1 [6] subclause 4.6.1.

6.2B.2.2.5 Test requirement

The maximum output power, derived in step 3 shall be within the range prescribed by the nominal maximum output power and tolerance in table 6.2B.2.2.5-1.

Table 6.2B.2.2.5-1: UE Power Class test requirements

TBD

6.2B.2.3 UE Maximum Output Power reduction for Inter-Band EN-DC within FR1

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- Working assumption: SA FR1 MPR requirement applies to this test case
- Working assumption: E-UTRA is not tested during test procedure
- Test requirement is FFS (configured maximum output power tolerance for inter-band EN-DC within FR1 is missing in 38.101-3)
- Future optimization is possible by include this test case with corresponding ACLR test case

6.2B.2.3.1 Test purpose

Same test purpose as in clause 6.2.2.1 in TS 38.521-1 [8] for the NR carrier.

6.2B.2.3.2 Test applicability

The requirements of this test apply to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC.

6.2B.2.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.2.2.3 in TS 38.521-1 [8] for the NR carrier.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.2B.2.3.

6.2B.2.3.4 Test description

Same test description as in clause 6.2.2.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

Table 6.2B.2.3.4-1: E-UTRA Test Configuration Table

E-UTRA Test Parameters				
E-UTRA Channel Bandwidth	**E-UTRA Test Frequency**	**Downlink**	**Uplink**	
		N/A for MPR	**Modulation**	**RB allocation**
5 MHz	MidRange		QPSK	25
NOTE 1: E-UTRA Test Frequency as specified in TS 36.508 [11] subclause 4.3.1.				

For Initial conditions as in clause 6.2.2.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3 with E-UTRA channel bandwidth and test frequencies defined in Table 6.2B.2.3.4-1.

3.1. Downlink E-UTRA signals are initially set up according to TS 36.521-1 [10] Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4.1. The E-UTRA UL Reference Measurement channels are set according to Table 6.2B.2.3.4-1.

Step 6 of Initial conditions as in clause 6.2.2.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508 [6] clause 4.5.

Same test procedure as in clause 6.2.2.4.2 in TS 38.521-1 [8].

6.2B.2.3.5 Test requirement

FFS

6.2B.2.4 UE Maximum Output Power reduction for Inter-Band EN-DC including FR2

Editor's Note: Following aspects are missing or under discussion

- Assumption is that 38.101-2 requirement applies (requirement is empty in 38.101-3)
- Test configuration table is FFS (referenced FR2 test case is incomplete)

6.2B.2.4.1 Test purpose

To verify that the error of the UE maximum output power does not exceed the range prescribed by the specified maximum output power with MPR and tolerance.

An excess maximum output power has the possibility to interfere to other channels or other systems. A small maximum output power decreases the coverage area.

6.2B.2.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2.

6.2B.2.4.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.2.2.3 in TS 38.521-2 [9] for the NR carrier. No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.2B.2.4.4 Test description

6.2B.2.4.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and test channel bandwidths based on NR operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC combination of test channel bandwidth and sub-carrier spacing, and are shown in table 6.2B.2.4.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521.1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.7-1.

Table 6.2B.2.4.4.1-1: Test configuration Table

FFS

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.1.1 for TE diagram and section A.3.2.1 for UE diagram.
2. The parameter settings for NR cell are set up according to TS 38.508-1 [6] subclause 4.4.3.
3. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1[10].
4. NR downlink signals are initially set up according to Annex C.0, C.1, and C.2 and uplink signals according to Annex G.0, G.1, G.2, and G.3.0 of TS38.521-1[8].
5. The UL Reference Measurement channels for NR are set according to Table 6.5.3.1.4.1-1 of TS38.521-1[8].
8. NR propagation conditions are set according to Annex B.0 of TS38.521-1[8].
9. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.2B.2.4.4.3.

10 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.2B.2.4.4.2 Test procedure

Same test procedure as in clause 6.2.2.4.2 in TS 38.521-2 [9].

6.2B.2.4.4.3 Message contents

Same message contents as in clause 6.2.2.4.3 in TS 38.521-2 [9].

6.2B.2.4.5 Test requirement

Same test requirement as in clause 6.2.2.5 in TS 38.521-2 [9].

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

6.2B.3.1 UE Additional Maximum Output Power reduction for Intra-band contiguous EN-DC

Editor's note: The following aspects are either missing or not yet determined:

- Testing with dynamic and static power sharing is FFS.

- Test requirements are TBD.

6.2B.3.1.1 Test purpose

Additional emission requirements can be signalled by the network with network signalling value indicated by the field *additionalSpectrumEmission.* To meet these additional requirements, additional maximum power reduction (A-MPR) is allowed for the maximum output power as specified in Table 6.2B.1.1.3-1. Unless stated otherwise, an A-MPR of 0 dB shall be used.

6.2B.3.1.2 Test applicability

The requirements of this test apply in test case 6.5B.2.1.2 Additional spectrum emission mask for network signalled values NS_04 and NS_35 to all types of NR UE release 15 and forward, supporting intra-band contiguous EN-DC.

6.2B.3.1.3 Minimum conformance requirements

For EN-DC band combinations with additional requirements the A-MPR allowed are specified in table 6.2B.3.1.3-1 for combinations of network signalling values indicated in E-UTRA and NR cell group(s). Unless otherwise stated the A-MPR specified in sub-clause 6.2B.3.1 for intra-band contiguous EN-DC configurations includes MPR.

Table 6.2B.3.1.3-1: Additional maximum power reduction for Intra-band contiguous EN-DC

DC configuration	Requirement (sub-clause)	E-UTRA network signalling value	NR network signalling value	A-MPR (subclause)
DC_(n)71AA	6.5B.2.1.2.3.1	NS_35	NS_35	6.2B.3.1.3.1[3]
DC_(n)41AA[1]	6.5B.2.1.2.3.2	NS_01 or NS_04	NS_04	6.2B.3.1.3.2[4]
NOTE 1: Only applies to UEs that support dual UL transmission for this EN-DC combination. NOTE 2: The network signalling value for NR is mapped to configured FBI and *AdditionalSpectrumEmission* values as specified in [6]. NOTE 3: The A-MPR is applied as MPR if NS_35 is not signalled. NOTE 4: The A-MPR is applied as MPR if NS_04 is not signalled.				

The normative reference for this requirement is TS 38.101-3 [4] clause 6.2B.3.1.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

6.2B.3.1.3.1 A-MPR for DC_(n)71AA

For UE supporting dynamic power sharing the following:

- for the MCG, A-MPR$_c$ in accordance with [5]
- 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 sub-clause.

For UEs not supporting dynamic power sharing the following

- for the MCG,

$$\text{A-MPR}_c = \text{A-MPR}_{LTE}$$

- for the SCG,

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

with A-MPR$_{LTE}$ and A-MPR$_{NR}$ as defined in this sub-clause.

For DC_(n)71AA with configured with network signalling values as per Table 6.2B.3.1.3-1the allowed A-MPR is defined by

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

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

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

- for OFDM:

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

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

6.50; $0.80 < A \leq 1.00$

- for DFT-S-OFDM:

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

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

6.00; $0.60 < A \leq 1.00$

where

$$A = \frac{L_{CRB,LTE} + L_{CRB,NR}}{N_{RB,LTE} + N_{RB,NR}}$$

with L_{CRB} and N_{RB} the number of allocated PRB and transmission bandwidth for the respective CG,

- for UE not indicating support of dynamicPowerSharing

$$A\text{-}MPR_{LTE} = CEIL\{ M_{A,LTE}, 0.5\}$$

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

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

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

$$A_{LTE,wc} = \frac{L_{CRB,LTE}+1}{N_{RB,LTE}+N_{RB,NR}}$$

$$A_{NR,wc} = \frac{1+L_{CRB,NR}}{N_{RB,LTE}+N_{RB,NR}}$$

[

$$\Delta_{LTE} = 10\ log_{10} \frac{N_{RB,LTE}}{N_{RB,LTE}+N_{RB,NR}}$$

$$\Delta_{NR} = 10\ log_{10} \frac{N_{RB,NR}}{N_{RB,LTE}+N_{RB,NR}}$$

]

6.2B.3.1.3.2 A-MPR for NS_04

6.2B.3.1.3.2.0 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 subclause. The A-MPR for EN-DC defined in this section is used instead of MPR defined in 6.2B.2.2, not additively, so EN-DC MPR=0 when NS_04 is signalled.

For UE supporting dynamic power sharing the following:

- for the MCG, A-MPR$_c$ in accordance with [5]
- for the SCG,

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

- for the total configured transmission power,

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

where

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

with

- $A\text{-}MPR_{single,\ E\text{-}UTRA}$ is the A-MPR defined for the E-UTRA transmission in [5]
- $A\text{-}MPR_{single,NR}$ is the A-MPR defined for the NR transmission in [2]
- $MPR_{single,E\text{-}UTRA}$ is the MPR defined for the E-UTRA transmission in [5]

For UEs not supporting dynamic power sharing the following

- for the MCG,

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

- for the SCG,

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

where

- $A\text{-}MPR_{single,\ E\text{-}UTRA}$ is the A-MPR defined for the E-UTRA transmission in [5]
- $A\text{-}MPR_{single,NR}$ is the A-MPR defined for the NR transmission in [2]
- $MPR_{single,E\text{-}UTRA}$ is the MPR defined for the E-UTRA transmission in [5]

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

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

Channel Configuration Case B. $A\text{-}MPR_{IM3}$ defined in subclause 6.2B.3.1.3.2.2.

Else

Channel Configuration Case A. $A\text{-}MPR_{IM3}$ defined in subclause 6.2B.3.1.3.2.1.

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

6.2B.3.1.3.2.1 A-MPR$_{IM3}$ for NS_04 to meet -13 dBm / 1MHz for 26dBm UE power

A-MPR in this sub-clause is relative to 26 dBm for power class 2. The same A-MPR is used relative to 23 dBm for power class 3. For the UE is configured with channel configurations Case A or Case C (defined in Subclause 6.2B.3.2.3.1), 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:

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

Where M_A is defined as follows

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

Where:

For UEs supporting dynamic power sharing,

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

For UEs not supporting dynamic power sharing,

For E-UTRA

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

For NR

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

and M_A is reduced by 1 dB.

6.2B.3.1.3.2.2 A-MPR for NS_04 to meet -25 dBm / 1MHz for 26 dBm UE power

A-MPR in this sub-clause is relative to 26 dBm. The same A-MPR is used relative to 23 dBm for power class 3. For the UE is configured with channel configurations Case B or Case D (defined in subclause 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:

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

Where M_A is defined as follows

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

Where:

For UEs supporting dynamic power sharing,

$$B = (L_{CRB\_alloc,\ E\text{-}UTRA} * 12 * SCS_{E\text{-}UTRA} + L_{CRB\_alloc,NR} * 12 * SCS_{NR})/1{,}000.000$$

For UEs not supporting dynamic power sharing,

For E-UTRA

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

For NR

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

and MA is reduced by 1 dB.

6.2B.3.1.4 Test description

6.2B.3.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All these configurations shall be tested with applicable test parameters for each EN-DC configuration specified in clause 5.3B.1.2 and are shown in table 6.5B.2.1.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 6.2B.3.1.4.1-0: E-UTRA test configuration table for NS_04

E-UTRA Test Parameters				
E-UTRA Channel Bandwidth	**E-UTRA Test Frequency (Note 1)**	**Downlink**	**Uplink**	
			Modulation	**RB allocation**
20 MHz	Low range and High range (Note 2)	N/A for A-MPR testing.	QPSK	100
NOTE 1: E-UTRA Test Frequency as specified in TS 36.508 [6] subclause 4.3.1 NOTE 2: NR carrier shall be the outermost carrier during test.				

Table 6.2B.3.1.4.1-1: Test configuration table (network signalled value "NS_35")

<table>
<tr><th colspan="9">Initial Conditions</th></tr>
<tr><td colspan="5">Test Environment as specified in TS 38.508-1 [6] subclause 4.1</td><td colspan="4">Normal</td></tr>
<tr><td colspan="5">Test Frequencies as specified in TS 38.508-1 [6] subclause 4.3.1</td><td colspan="4">Low range and High range (Note 1)</td></tr>
<tr><td colspan="5">Test CC Combinations setting ($N_{RB\_agg)}$ as specified in TS 38.508-1 [6] subclause 4.3.1</td><td colspan="4">Lowest N_{RB_agg}, Highest N_{RB_agg} (Note 2)</td></tr>
<tr><td colspan="5">Test SCS as specified in Table 5.3.5-1</td><td colspan="4">Lowest and Highest</td></tr>
<tr><th colspan="9">A-MPR test parameters for “NS_35”</th></tr>
<tr><th rowspan="3">Test ID</th><th rowspan="3">Freq</th><th rowspan="3">ChBw</th><th rowspan="3">SCS</th><th rowspan="3">Downlink Configuration</th><th colspan="4">EN-DC Uplink Configuration</th></tr>
<tr><th colspan="2">E-UTRA Cell</th><th colspan="2">NR Cell</th></tr>
<tr><th>Modulation</th><th>RB allocation</th><th>Modulation</th><th>NR RB allocation</th></tr>
<tr><td>1</td><td>Low</td><td rowspan="8">Default</td><td rowspan="8">Default</td><td rowspan="8">N/A for A-MPR testing.</td><td>16 QAM</td><td>Outer_Full</td><td>DFT-s-OFDM 64 QAM</td><td>Edge_1RB _Left</td></tr>
<tr><td>2</td><td>High</td><td>16 QAM</td><td>Outer_Full</td><td>DFT-s-OFDM 64 QAM</td><td>Edge_1RB _Left</td></tr>
<tr><td>3</td><td>Low</td><td>16 QAM</td><td>Outer_Full</td><td>DFT-s-OFDM 64 QAM</td><td>Edge_1RB _Right</td></tr>
<tr><td>4</td><td>Low</td><td>16 QAM</td><td>Outer_Full</td><td>DFT-s-OFDM 64 QAM</td><td>Edge_1RB _Right</td></tr>
<tr><td>5</td><td>High</td><td>16 QAM</td><td>Outer_Full</td><td>DFT-s-OFDM 64 QAM</td><td>Outer_Full</td></tr>
<tr><td>6</td><td>High</td><td>16 QAM</td><td>Outer_Full</td><td>DFT-s-OFDM 64 QAM</td><td>Outer_Full</td></tr>
<tr><td>5</td><td>High</td><td>16 QAM</td><td>Outer_Full</td><td>DFT-s-OFDM 64 QAM</td><td>Outer_Full</td></tr>
<tr><td>6</td><td>High</td><td>16 QAM</td><td>Outer_Full</td><td>DFT-s-OFDM 64 QAM</td><td>Outer_Full</td></tr>
<tr><td colspan="9">NOTE 1: NR carrier shall be the outermost carrier during test.
NOTE 2: NOTE 2: If the UE supports multiple CC combinations in the EN-DC configuration with the same N_{RB_agg}, select the combination to test as follows:
- Lowest ENBW: NR component with lowest N_{RB} is tested.
- Highest ENBW: NR component with highest N_{RB} is tested.</td></tr>
</table>

Table 6.2B.3.1.4.1-2: NR test configuration table for NS_04

Initial Conditions									
Test Environment as specified in TS 38.508-1 [6] subclause 4.1					NC				
Test Frequencies as specified in TS 38.508-1 [6] subclause 4.3.1					Low range, High range				
Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1					Lowest N_{RB_agg}, Highest N_{RB_agg} (Note 2)				
Test SCS for the NR cell as specified in TS 38.521-1 [8] Table 5.3.5-1					Lowest, Highest				
Test Parameters									
Test ID	Freq	ChBw	SCS	Downlink Configuration	EN-DC Uplink Configuration				
					E-UTRA Cell		NR Cell		Common
					Modulation	RB allocation (Note 5)	Modulation	RB allocation (NOTE 1)	Power sharing config.
1	Default	Default	Default	N/A for A-MPRtest case	16QAM	Outer_Full	DFT-s-OFDM PI/2 BPSK	Outer_Full	A and B
2 (Note 3)	Default				16QAM	Outer_1RB_Left	DFT-s-OFDM PI/2 BPSK	Edge_1RB_Right	A and B
3 (Note 3)	Low				16QAM	Outer_1RB_Left	DFT-s-OFDM PI/2 BPSK	N/A	A and B
4 (Note 3)	High				16QAM	N/A	DFT-s-OFDM PI/2 BPSK	Edge_1RB_Right	A and B
5 (Note 4)	Default				16QAM	Outer_1RB_Right	DFT-s-OFDM PI/2 BPSK	Edge_1RB_Left	A and B
6 (Note 4)	Low				16QAM	N/A	DFT-s-OFDM PI/2 BPSK	Edge_1RB_Left	A and B
7 (Note 4)	High				16QAM	Outer_1RB_Right	DFT-s-OFDM PI/2 BPSK	N/A	A and B
8	Default				16QAM	Outer_Full	DFT-s-OFDM QPSK	Outer_Full	A and B
9 (Note 3)	Default				16QAM	Outer_1RB_Left	DFT-s-OFDM QPSK	Edge_1RB_Right	A and B
10 (Note 3)	Low				16QAM	Outer_1RB_Left	DFT-s-OFDM QPSK	N/A	A and B
11 (Note 3)	High				16QAM	N/A	DFT-s-OFDM QPSK	Edge_1RB_Right	A and B
12 (Note 4)	Default				16QAM	Outer_1RB_Right	DFT-s-OFDM QPSK	Edge_1RB_Left	A and B
13 (Note 4)	Low				16QAM	N/A	DFT-s-OFDM QPSK	Edge_1RB_Left	A and B
14 (Note 4)	High				16QAM	Outer_1RB_Right	DFT-s-OFDM QPSK	N/A	A and B
15	Default				16QAM	Outer_Full	DFT-s-OFDM 16QAM	Outer_Full	A and B
16 (Note 3)	Default				16QAM	Outer_1RB_Left	DFT-s-OFDM 16QAM	Edge_1RB_Right	A and B
17 (Note 3)	Low				16QAM	Outer_1RB_Left	DFT-s-OFDM 16QAM	N/A	A and B
18 (Note 3)	High				16QAM	N/A	DFT-s-OFDM 16QAM	Edge_1RB_Right	A and B
19 (Note 4)	Default				16QAM	Outer_1RB_Right	DFT-s-OFDM 16QAM	Edge_1RB_Left	A and B
20 (Note 4)	Low				16QAM	N/A	DFT-s-OFDM 16QAM	Edge_1RB_Left	A and B
21 (Note 4)	High				16QAM	Outer_1RB_Right	DFT-s-OFDM 16QAM	N/A	A and B
22	Default				16QAM	Outer_Full	DFT-s-OFDM 64QAM	Outer_Full	A and B
23 (Note 3)	Low				16QAM	Outer_1RB_Left	DFT-s-OFDM 64QAM	Edge_1RB_Right	A and B
24 (Note 4)	High				16QAM	Outer_1RB_Right	DFT-s-OFDM 64QAM	Edge_1RB_Left	A and B
25	Default				16QAM	Outer_Full	DFT-s-OFDM 256QAM	Outer_Full	A and B
26 (Note 3)	Low				16QAM	Outer_1RB_Left	DFT-s-OFDM 256QAM	Edge_1RB_Right	A and B

27 (Note 4)	High				16QAM	Outer_1RB_Right	DFT-s-OFDM 256QAM	Edge_1RB_Left	A and B
28	Default				16QAM	Outer_Full	CP-OFDM QPSK	Outer_Full	A and B
29 (Note 3)	Default				16QAM	Outer_1RB_Left	CP-OFDM QPSK	Edge_1RB_Right	A and B
30 (Note 3)	Low				16QAM	Outer_1RB_Left	CP-OFDM QPSK	N/A	A and B
31 (Note 3)	High				16QAM	N/A	CP-OFDM QPSK	Edge_1RB_Right	A and B
32 (Note 4)	Default				16QAM	Outer_1RB_Right	CP-OFDM QPSK	Edge_1RB_Left	A and B
33 (Note 4)	Low				16QAM	N/A	CP-OFDM QPSK	Edge_1RB_Left	A and B
34 (Note 4)	High				16QAM	Outer_1RB_Right	CP-OFDM QPSK	N/A	A and B
35	Default				16QAM	Outer_Full	CP-OFDM 16QAM	Outer_Full	A and B
36 (Note 3)	Default				16QAM	Outer_1RB_Left	CP-OFDM 16QAM	Edge_1RB_Right	A and B
37 (Note 3)	Low				16QAM	Outer_1RB_Left	CP-OFDM 16QAM	N/A	A and B
38 (Note 3)	High				16QAM	N/A	CP-OFDM 16QAM	Edge_1RB_Right	A and B
39 (Note 4)	Default				16QAM	Outer_1RB_Right	CP-OFDM 16QAM	Edge_1RB_Left	A and B
40 (Note 4)	Low				16QAM	N/A	CP-OFDM 16QAM	Edge_1RB_Left	A and B
41 (Note 4)	High				16QAM	Outer_1RB_Right	CP-OFDM 16QAM	N/A	A and B
42	Default				16QAM	Outer_Full	CP-OFDM 64QAM	Outer_Full	A and B
43 (Note 3)	Low				16QAM	Outer_1RB_Left	CP-OFDM 64QAM	Edge_1RB_Right	A and B
44 (Note 4)	High				16QAM	Outer_1RB_Right	CP-OFDM 64QAM	Edge_1RB_Left	A and B
45	Default				16QAM	Outer_Full	CP-OFDM 256QAM	Outer_Full	A and B
46 (Note 3)	Low				16QAM	Outer_1RB_Left	CP-OFDM 256QAM	Edge_1RB_Right	A and B
47 (Note 4)	High				16QAM	Outer_1RB_Right	CP-OFDM 256QAM	Edge_1RB_Left	A and B
NOTE 1: The specific configuration of each RB allocation is defined in Table 6.1-1 in TS 38.521-1 [8]. NOTE 2: If the UE supports multiple CC combinations in the EN-DC configuration with the same N_{RB_agg}, select the combination to test as follows: - Lowest ENBW: NR component with lowest N_{RB} is tested. - Highest ENBW: NR component with highest N_{RB} is tested. NOTE 3: Applicable when E-UTRA cell carrier frequency is lower than NR cell carrier. NOTE 4: Applicable when NR cell carrier frequency is lower than E-UTRA cell carrier. NOTE 5: Outer_Full defined as the transmission bandwidth configuration N_{RB} per channel bandwidth for the E-UTRA component as indicated in TS 36.521 [10] Table 5.4.2-1. Outer_1RB_Left defined as 1 RB allocated at the left edge of the E-UTRA component. Outer_1RB_Right defined as 1 RB allocated at the right edge of the E-UTRA component. NOTE 6: DFT-s-OFDM PI/2 BPSK test applies only for UEs which supports half Pi BPSK in FR1.									

Editor's note: The following lines belong at the end of section 6.2B.3.1.4.1. As new tables are added to this section, these lines should always follow the tables.

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [6] Annex A, Figure A.3.1.1.1 for TE diagram and section A.3.2.1 for UE diagram.

2. The parameter settings for E-UTRA the cell are set up according to TS 36.508 [11] subclause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] subclause 4.4.3.

3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0 and TS 38.521-1 [8] Annex C.0 for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively. 4. The UL Reference Measurement channels are set according to TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG link respectively.

5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.2B.3.1.4.3.

6.2B.3.1.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format [0_1] for C_RNTI to schedule the UL RMC according to table 6.2B.3.1.4.1-1 on both EN-DC component carriers. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

2. Send continuously uplink power control "up" commands to the UE for NR and E-UTRA carrier until the UE transmits at its P_{UMAX} level; allow at least 200 ms from the first TPC command for the UE to reach P_{UMAX} level.

3. Measure the mean power over all component carriers for the EN-DC configuration, which shall meet the requirements described in table 6.2B.3.1.5.1-1 thru 6.2B.3.1.5.2-1. The period of the measurement shall be at least the continuous duration of one active sub-frame (1ms). For TDD slots with transient periods are not under test.

NOTE 1: When switching to DFT-s-OFDM waveform, as specified in the test configuration table 6.5B.2.1.2.4.1-1 and 6.5B.2.1.2.4.1-2, send an RRCConnectionReconfiguration message containing NR RRCReconfiguration message according to TS 38.508-1 [6] clause 4.6.3 Table 4.6.3-118 PUSCH-Config without CP-OFDM condition. When switching to CP-OFDM waveform, send an RRCConnectionReconfiguration message containing NR RRCReconfiguration message with CP-OFDM condition.

6.2B.3.1.4.3 Message contents

Message contents are according to TS 38.508-1 [6] subclause 4.6.1, with the following exceptions for each network signalled value.

6.2B.3.1.4.3.0 Message contents exceptions (power sharing configurations)

Table 6.2B.3.1.4.3.0-1: SystemInformationBlockType1: power sharing configuration A

Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3 SystemInformationBlockType1			
Information Element	**Value/remark**	**Comment**	**Condition**
p-Max	20	20 dBm, E-UTRA	

Table 6.2B.3.1.4.3.0-2: *P-Max:* power sharing configuration A

Derivation Path: TS 38.508 [6], clause 4.6.2, Table 4.6.3-66 P-Max			
Information Element	**Value/remark**	**Comment**	**Condition**
P-Max	20	20 dBm, NR	

Table 6.2B.3.1.4.3.0-3: SystemInformationBlockType1: power sharing configuration B

Derivation Path: TS 36.508 [7] clause 4.4.3.2, Table 4.4.3.2-3 SystemInformationBlockType1			
Information Element	**Value/remark**	**Comment**	**Condition**
p-Max	20	20 dBm, E-UTRA	

Table 6.2B.3.1.4.3.0-4: *P-Max:* power sharing configuration B

Derivation Path: TS 38.508 [6], clause 4.6.2, Table 4.6.3-66 P-Max			
Information Element	**Value/remark**	**Comment**	**Condition**
P-Max	23	23 dBm, NR	

6.2B.3.1.4.3.1 Message contents exceptions (network signalled value "NS_04")

1. Information element additionalSpectrumEmission is set to NS_04. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2B.3.1.4.3.1-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_04"

Derivation Path: TS 38.508-1 [6] clause [TBD], Table [TBD]			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	4 (NS_04)		

6.2B.3.1.4.3.2 Message contents exceptions (network signalled value "NS_35")

1. Information element additionalSpectrumEmission is set to NS_35. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2B.3.1.4.3.2-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_35"

Derivation Path: TS 38.508-1 [5] clause [TBD], Table [TBD]			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	2 (NS_35)		

6.2B.3.1.5 Test requirement

6.2B.3.1.5.1 Test requirement for network signalled value “NS_35”

The maximum output power, derived in step 3 shall be within the range prescribed by the nominal maximum output power and tolerance in table 6.2B.3.1.5.1-1. The allowed A-MPR values specified in table 6.2B.3.1.3-1 are in addition to the allowed MPR requirements specified in clause 6.2B.1.1.3. For the UE maximum output power modified by MPR and/or A-MPR, the power limits specified in table 6.2B.1.1.3-1 apply.

Table 6.2B.3.1.5.1-1: UE Power Class test requirements for network signalled value "NS_35"

Configuration ID	MPR (dB)	A-MPR (dB)	[$\Delta T_{C,c}$ (dB)]	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX\_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	TBD	TBD	TBD	TBD	TBD	TBD	TBD
2	TBD	TBD	TBD	TBD	TBD	TBD	TBD
3	TBD	TBD	TBD	TBD	TBD	TBD	TBD
4	TBD	TBD	TBD	TBD	TBD	TBD	TBD
5	TBD	TBD	TBD	TBD	TBD	TBD	TBD
6	TBD	TBD	TBD	TBD	TBD	TBD	TBD
7	TBD	TBD	TBD	TBD	TBD	TBD	TBD
8	TBD	TBD	TBD	TBD	TBD	TBD	TBD
NOTE 1: FFS							

6.2B.3.1.5.2 Test requirement for network signalled value “NS_04”

Table 6.2B.3.1.5.2-1: UE Power Class 2 test requirements for network signalled value "NS_04" for UEs not supporting dynamic power sharing with backoff applied independently

Test ID	Modulation	$\Delta P_{PowerClass}$ (dB)	MPR (dB)	A-MPR (dB)	$A\text{-}MPR_{IM3}$ (dB)	$A\text{-}MPR_c$ (dB)	ΔTC,c (dB) Note 7	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX\_L,f,c})$ (dB)	$T_{L,c}$ (dB)	Upper limit	Lower limit
1, 8, 15, 22, 25, 28, 35, 42 and 45	E-UTRA Note 1	0	2	0	5	**5**	0 (1.5)	18 (16.5)	4 (5)	2 (3.5)	25+TT	14-TT (11.5-TT)
1, 8, 15, 22, 25, 28, 35, 42 and 45	E-UTRA Note 2	0	2	0	11	11	0 (1.5)	12 (10.5)	6 (6)	2 (3.5)	25+TT	6+TT (4.5-TT)
1, 8, 15, 22, 25, 28, 35, 42 and 45	NR, Note 1	0	-	Note 5	5	5	0 (1.5)	18 (16.5)	4 (5)	2 (3.5)	25+TT	14-TT (11.5-TT)
1, 8, 15, 22, 25, 28, 35, 42 and 45	NR, Note 2	0	-	Note 5	11	11	0 (1.5)	12 (10.5)	6 (6)	2 (3.5)	25+TT	6+TT (4.5-TT)
2, 5, 9, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, and 47	E-UTRA Note 1, 3	0	1	Note 6	14	14	0 (1.5)	9 (7.5)	6 (7)	2 (3.5)	25+TT	3-TT (0.5-TT)
2, 5, 9, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, and 47	E-UTRA Note 1, 4	0	1	Note 6	9	9	0 (1.5)	14 (12.5)	5 (6)	2 (3.5)	25+TT	9-TT (6.5-TT)
2, 5, 9, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, and 47	E-UTRA Note 2	0	1	Note 6	14	14	0 (1.5)	9 (7.5)	6	2 (3.5)	25+TT	3-TT (0.5-TT)
2, 5, 9, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, and 47	NR Note 1, 3	0	-	Note 5	14	14	0 (1.5)	9 (7.5)	6 (7)	2 (3.5)	25+TT	3-TT (0.5-TT)
2, 5, 9, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, and 47	NR Note 1, 4	0	-	Note 5	9	9	0 (1.5)	14 (12.5)	5 (6)	2 (3.5)	25+TT	9-TT (6.5-TT)
2, 5, 9, 16, 19, 23, 24, 26, 27, 29, 32, 36, 39, 43, 44, 46, and 47	NR Note 2	0	-	Note 5	11	11	0 (1.5)	9 (7.5)	6 (6)	2 (3.5)	25+TT	3-TT (0.5-TT)
3, 7, 10, 14, 17, 21, 30, 34, 37, 41	E-UTRA Note 1	0	1	Note 6	14	14	0 (1.5)	9 (7.5)	6 (7)	2 (3.5)	25+TT	3-TT (0.5-TT)
3, 7, 10, 14, 17, 21, 30, 34, 37 and 41	E-UTRA Note 2	0	1	Note 6	14	14	0 (1.5)	9 (7.5)	6 (7)	2 (3.5)	25+TT	3-TT (0.5-TT)
4, 6, 11, 13, 18, 20, 31, 33,38 and 40	NR Note 1, 3	0	-	Note 5	14	14	0 (1.5)	9 (7.5)	6 (7)	2 (3.5)	25+TT	3-TT (0.5-TT)

4, 6, 11, 13, 18, 20, 31, 33,38 and 40	NR Note 1,4	0	-	Note 5	9	9	0 (1.5)	14 (12.5)	5 (6)	2 (3.5)	25+TT	9-TT (6.5-TT)
4, 6, 11, 13, 18, 20, 31, 33,38 and 40	NR Note 2	0	-	Note 5	14	14	0 (1.5)	9 (7.5)	6 (6)	2 (3.5)	25+TT	3-TT (0.5-TT)

NOTE 1: When $F_{IM3,low\_block,low} \geq$ 2490.5 MHz (Case A)
NOTE 2: When $F_{IM3,low\_block,low} <$ 2490.5 MHz (Case B)
NOTE 3: When NR SCS = 15kHz.
NOTE 4: When NR SCS = 30 kHz or 60 kHz.
NOTE 5: NR A-MPR values for NS_04 are defined in Table 6.2.3.3.2-1.
NOTE 6: E-UTRA A-MPR= 3 dB for 1 RB and fc < 2517.5 MHz, otherwise 0 dB.
NOTE 7: $\Delta T_{C,c}$ = 1.5 dB for transmission bandwidths confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high}, otherwise 0 dB.
NOTE 8: TT for each frequency and channel bandwidth is specified in Table 6.2.2.5-5.

Table 6.2B.3.1.5.2-2: UE Power Class 3 test requirements for network signalled value "NS_04" for UEs supporting dynamic power sharing with backoff applied equally to LTE and NR

Configuration ID	$F_{IM3,low\_block.low}$	$A\text{-}MPR_{IM3}$(dB)	A-MPR (dB)	TBD	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX\_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
2	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
3	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
4	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
5	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
6	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

6.2B.3.2 UE Additional Maximum Output Power reduction for Intra-Band Non-Contiguous EN-DC

Editor's note: The following aspects are either missing or not yet determined:

- SA message contents in TS 38.508-1[6] subclause 4.6 is FFS

- UE Power Class test requirements

- Test tolerance is not complete.

6.2B.3.2.1 Test purpose

Additional emission requirements can be signalled by the network with network signalling value indicated by the field *additionalSpectrumEmission*. To meet these additional requirements, additional maximum power reduction (A-MPR) is allowed for the maximum output power as specified in Table 6.2B.1.1.3-1. Unless stated otherwise, an A-MPR of 0 dB shall be used.

6.2B.3.2.2 Test applicability

The requirements of this test apply in test case 6.5B.2.1.2 Additional spectrum emission mask for network signalled values NS_04 to all types of NR UE release 15 and forward, supporting intra-band non-contiguous EN-DC.

6.2B.3.2.3 Minimum conformance requirements

For EN-DC band combinations with additional requirements the A-MPR allowed are specified in table 6.2B.3.2.3-1 for combinations of network signalling values indicated in E-UTRA and NR cell group(s). Unless otherwise stated the A-MPR allowed below is in addition to the MPR requirements specified in sub-clause 6.2B.2.1.

Table 6.2B.3.2.3-1: Allowed power reduction for intra-band non-contiguous EN-DC

DC configuration	Requirement (sub-clause)	E-UTRA network signalling value	NR network signalling value	A-MPR (subclause)
DC_41A_n41[1]	6.6.3.3.19 and 6.6.2.2.2 of TS 36.101 [5] and 6.5.2.3.2 and 6.5.3.3.1 of TS 38.101-1 [2]	NS_01 or NS_04	NS_04	6.2B.3.2.3.1
NOTE 1: Only applies to UEs that support dual UL transmission for this EN-DC combination. NOTE 2: The A-MPR is applied as MPR if NS_04 is not signalled				

The normative reference for this requirement is TS 38.101-3 [4] clause 6.2B.3.2.

6.2B.3.2.3.1 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 subclause. The A-MPR for EN-DC defined in this section is used instead of MPR defined in 6.2B.2.2, not additively, so EN-DC MPR=0 when NS_04 is signalled.

The UE determines the Channel Configuration Case and the value of A-MPR_{IM3} as follows:

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

Channel Configuration Case C. A-MPR_{IM3} defined in Subclause 6.2B.3.1.3.2.1

Else

Channel Configuration Case D. A-MPR_{IM3} defined in Subclause 6.2B.3.1.3.2.2

where

- $F_{IM3,low\_block,high} = (2 * F_{low\_channel,high\_edge}) - F_{high\_channel,low\_edge}$
- $F_{IM3,high\_block,low} = (2 * F_{high\_channel,low\_edge}) - F_{low\_channel,high\_edge}$
- $F_{low\_channel,low\_edge}$ is the lowermost frequency of lower transmission bandwidth configuration.
- $F_{low\_channel,high\_edge}$ is the uppermost frequency of lower transmission bandwidth configuration.
- $F_{high\_channel,low\_edge}$ is the lowermost frequency of upper transmission bandwidth configuration.
- $F_{high\_channel,high\_edge}$ is the uppermost frequency of upper transmission bandwidth configuration.
- $F_{filter,low}$ = 2480 MHz
- $F_{filter,high}$ = 2745 MHz
- $SEM_{-13,high}$ = Threshold frequency where upper spectral emission mask for upper channel drops from -13 dBm / 1MHz to -25 dBm / 1MHz, as specified in Subclause 6.2B.3.1.3.2.2.

The UE determines the value of A-$MPR_{ACLRoverlap}$ as specified in Table 6.2B.3.2.3.1-1:

Table 6.2B.3.2.3.1-1: A-$MPR_{ACLRoverlap}$

W_{gap}	A-$MPR_{ACLRoverlap}$
< $BW_{channel,E-UTRA} + BW_{channel,NR}$	4 dB
≥ $BW_{channel,E-UTRA} + BW_{channel,NR}$	0 dB
NOTE 1: $W_{gap} = F_{high\_channel,low\_edge} - F_{low\_channel,high\_edge}$	

The UE determines the total allowed maximum output power reduction as follows:

For UEs not supporting dynamic power sharing, with backoff applied independently

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

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

For UEs supporting dynamic power sharing , with IM3 backoff applied equally to E-UTRA and NR

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

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

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

where

- $\text{A-MPR}_{\text{single,E-UTRA}}$ is the A-MPR defined for the E-UTRA transmission in TS 36.101 [5].
- $\text{A-MPR}_{\text{single,NR}}$ is the A-MPR defined for the NR transmission in TS 38.101-1 [2].
- $\text{MPR}_{\text{single,E-UTRA}}$ is the MPR defined for the E-UTRA transmission in [5].

6.2B.3.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and sub-carrier spacing based on NR operating bands specified in table 5.2B.3.1-1. All of these configurations shall be tested with applicable test parameters for each combination of test channel bandwidth and sub-carrier spacing, and are shown in table 6.2B.3.2.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A2. Configurations of PDSCH and PDCCH before measurement are specified in Annex TS 36.521-1 [10] Annex C and in Annex C2 for LTE link and NR link respectively.

Table 6.2B.3.2.4.1-0: E-UTRA test configuration table

E-UTRA Test Parameters				
E-UTRA Channel Bandwidth	E-UTRA Test Frequency (Note 1)	Downlink	Uplink	
			Modulation	RB allocation
20 MHz	Low range and High range (Note 2)	N/A for A-MPR testing.	QPSK	100
NOTE 1: E-UTRA Test Frequency as specified in TS 36.508 [6] subclause 4.3.1 NOTE 2: NR carrier shall be the outermost carrier during test.				

Table 6.2B.3.2.4.1-1: NR test configuration table for NS_04

Initial Conditions						
Test Environment as specified in TS 38.508-1 [6] subclause 4.1				Normal		
Test Frequencies as specified in TS 38.508-1 [6] subclause 4.3.1				Low range and High range (Note 1)		
Test Channel Bandwidths as specified in TS 38.508-1 [6] subclause 4.3.1				Lowest and Highest		
Test SCS as specified in Table 5.3.5-1				Lowest and Highest		
A-MPR test parameters for "NS_04"						
				Downlink Configuration	Uplink Configuration	
Test ID	Freq	ChBw	SCS	N/A for A-MPR testing	Modulation	NR RB allocation
1	Low	Default	Default		DFT-s-OFDM 64 QAM	Outer_1RB_Left
2	High	Default	Default		DFT-s-OFDM 64 QAM	Outer_1RB_Right
3	Low	Lowest	Default		DFT-s-OFDM 64 QAM	Full
4	Low	Highest	Default		DFT-s-OFDM 64 QAM	Full
5	High	Lowest	Default		DFT-s-OFDM 64 QAM	Full
6	High	Highest	Default		DFT-s-OFDM 64 QAM	Full
NOTE 1: NR carrier shall be the outermost carrier during test.						

Editor's note: The following lines belong at the end of section 6.2B.3.2.4.1. As new tables are added to this section, these lines should always follow the tables.

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [6] Annex A, Figure A.3.1.1.1 for TE diagram and section A.3.2.1 for UE diagram.

2. The parameter settings for the cell are set up according to TS 38.508-1 [6] subclause 4.4.3.

3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C for LTE link and NR link respectively, and uplink signals according to TS 36.521-1 [10] Annex H and Annex G for LTE link and NR link respectively.

4. The UL Reference Measurement channels are set according to TS 36.521-1 [10] Annex A.2 and Annex A for LTE link and NR link respectively.

5. Propagation conditions are set according to TS 36.521-1 [10] Annex B and Annex B for LTE link and NR link respectively.

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.2B.3.2.4.3.

6.2B.3.2.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format [0_1] for C_RNTI to schedule the UL RMC according to table 6.2B.3.2.4.1-1 on both EN-DC component carriers. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

2. Send continuously uplink power control "up" commands to the UE for NR and E-UTRA carrier until the UE transmits at its P_{UMAX} level; allow at least 200 ms starting from the first TPC command in this step for the UE to reach P_{UMAX} level.

3. Measure the mean power over all component carriers for the EN-DC configuration, which shall meet the requirements described in table 6.2B.3.2.5-1. The period of the measurement shall be at least the continuous duration of one sub-frame (1ms). [For TDD slots with transient periods are not under test.]

NOTE 1: When switching to DFT-s-OFDM waveform, as specified in the test configuration table 6.5B.2.1.2.4.1-1 and 6.5B.2.1.2.4.1-2, send an RRCConnectionReconfiguration message containing NR RRCReconfiguration message according to TS 38.508-1 [6] clause 4.6.3 Table 4.6.3-118 PUSCH-Config without CP-OFDM condition. When switching to CP-OFDM waveform, send an RRCConnectionReconfiguration message containing NR RRCReconfiguration message with CP-OFDM condition.

6.2B.3.2.4.3 Message contents

Message contents are according to TS 38.508-1 [6] subclause 4.6.1, with the following exceptions for each network signalled value.

6.2B.3.2.4.3.1 Message contents exceptions (network signalled value "NS_04")

1. Information element additionalSpectrumEmission is set to NS_04. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.2B.3.2.4.3.1-1: *SystemInformationBlockType2*: Additional spurious emissions test requirement for "NS_04"

Derivation Path: TS 38.508-1 [6] clause [TBD], Table [TBD]			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	4 (NS_04)		

6.2B.3.2.5 Test requirement

The maximum output power, derived in step 3 shall be within the range prescribed by the nominal maximum output power and tolerance in table 6.2B.3.2.5-1. The allowed A-MPR values specified in table 6.2B.3.2.3-1 are in addition to the allowed MPR requirements specified in clause 6.2B.1.1.3. For the UE maximum output power modified by MPR and/or A-MPR, the power limits specified in table 6.2B.1.1.3-1 apply.

Table 6.2B.3.2.5-1: UE Power Class test requirements (network signalled value "NS_04")

Configuration ID	MPR (dB)	A-MPR (dB)	[$\Delta T_{C,c}$ (dB)]	$P_{CMAX,c}$ (dBm)	$T(P_{CMAX\_L,c})$ (dB)	Upper limit (dBm)	Lower limit (dBm)
1	TBD	TBD	TBD	TBD	TBD	TBD	TBD
2	TBD	TBD	TBD	TBD	TBD	TBD	TBD
3	TBD	TBD	TBD	TBD	TBD	TBD	TBD
NOTE 1: FFS							

6.2B.3.3 UE Additional Maximum Output Power reduction for Inter-Band EN-DC within FR1

FFS

6.2B.3.4 UE Additional Maximum Output Power reduction for Inter-Band EN-DC including FR2

Editor's Note: Following aspects are missing or under discussion

- Assumption is that 38.101-2 requirement applies (requirement is empty in 38.101-3)
- Test configuration table is FFS (referenced FR2 test case is incomplete)

6.2B.3.4.1 Test purpose

To verify that the error of the UE maximum output power does not exceed the range prescribed by the specified maximum output power with MPR and tolerance.

An excess maximum output power has the possibility to interfere to other channels or other systems. A small maximum output power decreases the coverage area.

6.2B.3.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2.

6.2B.3.4.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.2.2.3 in TS 38.521-2 [9] for the NR carrier. No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.2B.3.4.4 Test description

6.2B.3.4.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and test channel bandwidths based on NR operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC combination of test channel bandwidth and sub-carrier spacing, and are shown in table 6.2B.3.4.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521.1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.7-1.

Table 6.2B.3.4.4.1-1: Test configuration Table

FFS

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.1.1 for TE diagram and section A.3.2.1 for UE diagram.

2. The parameter settings for NR cell are set up according to TS 38.508-1 [6] subclause 4.4.3.

3. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1[10].

4. NR downlink signals are initially set up according to Annex C.0, C.1, and C.2 and uplink signals according to Annex G.0, G.1, G.2, and G.3.0 of TS38.521-1[8].

5. The UL Reference Measurement channels for NR are set according to Table 6.5.3.1.4.1-1 of TS38.521-1[8].

8. NR propagation conditions are set according to Annex B.0 of TS38.521-1[8].

9. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.2B.3.4.4.3.

10 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.2B.3.4.4.2 Test procedure

Same test procedure as in clause 6.2.2.4.2 in TS 38.521-2 [9].

6.2B.3.4.4.3 Message contents

Same message contents as in clause 6.2.2.4.3 in TS 38.521-2 [9].

6.2B.3.4.5 Test requirement

Same test requirement as in clause 6.2.2.5 in TS 38.521-2 [9].

6.2B.4 Configured Output Power for EN-DC

6.2B.4.1 Configured Output Power Level for EN-DC

6.2B.4.1.0 Minimum Conformance Requirements

6.2B.4.1.0.1 Configured output power level

6.2B.4.1.0.1.1 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 $\hat{P}^{EN-DC}_{Total}$.

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

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

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

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

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

- for a UE indicating support of dynamicPowerSharing, the A-MPR_c is determined in accordance with the DCI of serving cell *c* of the CG 1 and the specification in sub-clause 6.2.4 of [4];

- for a UE not indicating support of dynamicPowerSharing, the A-MPR_c is determined in accordance with sub-clause 6.2B.3.1 with parameters applicable for UEs not indicating support of dynamicPowerSharing and MPR_c = 0 dB;

The configured maximum output power $P_{CMAX\_NR,c}(q)$ 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 $P_{CMAX\_L\_NR,c}$ and $P_{CMAX\ H\_NR,c}$ are the limits for a serving cell c as specified in sub-clause 6.2.4 of TS 38.101-1 [2] modified by P_{NR} as follows:

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

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

- P_{LTE} and P_{NR} are the linear values for the P_{LTE} and P_{NR} respectively signalled by RRC defined in [7]
- $\Delta T_{c\_E\text{-}UTRA,c}$ = 1.5dB when NOTE 2 in Table 6.2.2-1 in TS 36.101 [4] applies for a serving cell c, otherwise $\Delta T_{C\_E\text{-}UTRA,c}$ = 0dB;
- $\Delta T_{C\_NR,c}$ = 1.5dB when NOTE 3 in Table 6.2.1-1 in TS 38.101-1 [2] applies for a serving cell c, otherwise $\Delta T_{C\_NR,c}$ = 0dB;
- $\Delta T_{IB,c}$ specified in sub-clause 6.2.7 for EN-DC, the individual Power Class defined in table 6.2B.1-3 and any other additional power reductions parameters specified in sub-clauses 6.2.3 and 6.2.4 for EN-DC are applicable to $P_{CMAX\_E\text{-}UTRA,c}$ and $P_{CMAX\_NR,c}$ evaluations.
- for a UE indicating support of dynamicPowerSharing, A-MPR_c = A-MPR'_c with A-MPR'_c determined in accordance with sub-clause 6.2B.3.1 and 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-MPR_c is determined in accordance with [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-MPR_c is determined in accordance with sub-clause 6.2B.3.1 with parameters applicable for UEs not indicating support of dynamicPowerSharing and MPR_c = 0 dB;

If the transmissions from NR and E-UTRA do not overlap, then the complete sub-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 $P_{PowerClass,\ EN\text{-}DC}$ or $P_{EMAX,\ EN\text{-}DC}$ shall not be exceeded at any time by UE.

If the EN-DC UE is not supporting dynamic power sharing, then the complete sub-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.

For UEs indicating support of dynamicPowerSharing in the *UE-MRDC-Capability* IE the UE can configure the total transmission power within the range

$$P_{EN\text{-}DC,tot\_L} \leq P_{EN\text{-}DC,tot} \leq P_{EN\text{-}DC,tot\_H}$$

where

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

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

for sub-frame p on CG 1 overlapping with physical channel q on CG 2 and A-MPR_{tot} in accordance with sub-clause 6.2B.3.1.

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

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

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

For UEs indicating support of dynamicPowerSharing, 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 $T_{LOW}(P_{CMAX\_L})$ and $T_{HIGH}(P_{CMAX\_H})$ for applicable values of P_{CMAX_L} and P_{CMAX_L} specified in Table 6.2B.4.1.0.1.1-2.

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.4.1.0.1.1-1 when same or different subframes and physical channel durations are used in aggregated carriers. $P_{PowerClass,EN\text{-}DC}$ shall not be exceeded by the UE during any evaluation period of time.

Table 6.2B.4.1.0.1.1-1: P_{CMAX} evaluation window

transmission duration	T_{REF}	T_{eval}
Different transmission duration in different RAT carriers	LTE Subframe	Min($T_{no\_hopping}$, 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:

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

where $P_{CMAX\_EN\text{-}DC\_H}$ 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_{eval} duration, where q+*n* is the last NR UL physical channel overlapping with LTE subframe p.

While P_{CMAX_L} is computed as follows:

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

where $P_{CMAX\_EN\text{-}DC\_L}$ 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_{eval} duration, where q+*n* is the last NR UL physical channel overlapping with LTE subframe p,

With

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

And:

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

$b = 10\log_{10}[p_{CMAX\_E\text{-}UTRA,c}(p) + p_{CMAX,f,c,NR}(q)/X\_scale] > P_{EN\text{-}DC,tot\_L}$

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

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

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

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

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

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

where

- $p_{CMAX\ H\_E\text{-}UTRA,c}(p)$ is the E-UTRA higher limit of the maximum configured power expressed in linear scale;
- $p_{CMAX\ H\_NR,c}(q)$ is the NR higher limit of the maximum configured power expressed in linear scale;
- $p_{CMAX\ L\_E\text{-}UTRA,c}(p)$ is the E-UTRA lower limit of the maximum configured power expressed in linear scale;
- $p_{CMAX\ L\_NR,c}(q)$ is the NR lower limit of the maximum configured power expressed in linear scale;
- $P_{PowerClass,\ EN\text{-}DC}$ is defined in sub-clause 6.2B.1.1-1 for intra-band EN-DC;
- X_scale is the linear value of X dB which is configured by RRC and can only take values [0 , 6] dB
- $p_{CMAX\ E\text{-}UTRA,c}(p)$ is the linear value of $P_{CMAX\ E\text{-}UTRA,c}(p)$, the real configured max power for LTE
- $p_{CMAX,f,c\ NR}(q)$ is the linear value of $P_{CMAX,f,c\ NR}(q)$, the real configured max power of NR

Table 6.2B.4.1.0.1.1-2: P_{CMAX} tolerance for Dual Connectivity LTE-NR

P_{CMAX}(dBm)	Tolerance $T_{LOW}(P_{CMAX\_L})$ (dB)	Tolerance $T_{HIGH}(P_{CMAX\_H})$ (dB)
$23 \le P_{CMAX} \le 33$	[3.0]	[2.0]
$22 \le P_{CMAX} < 23$	[5.0]	[2.0]
$21 \le P_{CMAX} < 22$	[5.0]	[3.0]
$20 \le P_{CMAX} < 21$	[6.0]	[4.0]
$16 \le P_{CMAX} < 20$	[5.0]	
$11 \le P_{CMAX} < 16$	[6.0]	
$-40 \le P_{CMAX} < 11$	[7.0]	

If the UE supports dynamic power sharing, and when LTE 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, $P_{UMAX,f,c,NR}(q)$, under nominal conditions and unless otherwise stated

$10\log(p_{CMAX\ L,f,c,,NR}(q)/X\_scale) - T_{LOW}(10\log(p_{CMAX\ L,f,c,,NR}(q)/X\_scale))\} \le P_{UMAX,f,c,NR}(q) \le 10\log(p_{CMAX\ H,\ f,c,,NR}(q)) + T_{HIGH}(10\log(p_{CMAX\ H,\ f,c,,NR}(q)))$.

with the tolerances T_{LOW} and T_{HIGH} for applicable values of P_{CMAX} specified in Table 6.2B.4.1.0.1.1-2.

If the UE supports dynamic power sharing, the measured maximum output power in subframe *p* on CG 1, $p_{UMAX,c,E\text{-}UTRA}$, shall meet the requirements in subclause 6.2.5 in [4] with the limits $P_{CMAX\_L,c}$ and $P_{CMAX\_H,c}$ replaced by $P_{CMAX\_L\_E\text{-}UTRA,c}$ and $P_{CMAX\_H\_E\text{-}UTRA,c}$ as specified above, respectively.

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

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

6.2B.4.1.0.1.2 Intra-band non-contiguous EN-DC

< equations for Pcmax >

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 $P_{CMAX\_E\text{-}UTRA,c}(p)$ in sub-frame *p* for the configured E-UTRA uplink carrier shall be set in accordance with sub-clause 6.2B.4.1.0.1.1 but where

- for a UE not indicating support of dynamicPowerSharing, the A-MPR_c determined in accordance with sub-clause 6.2B.3.2 with parameters applicable for UEs not indicating support of dynamicPowerSharing and MPR_c = 0 dB;

The configured maximum output power $P_{CMAX\_NR,c}(q)$ in physical channel *q* for the configured NR carrier shall be set in accordance with sub-clause 6.2B.4.1.0.1.1 but where

- for a UE indicating support of dynamicPowerSharing, A-MPR$_c$ = A-MPR'$_c$ with A-MPR'$_c$ determined in accordance with sub-clause 6.2B.3.2 and 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-MPR$_c$ is determined in accordance with [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-MPR$_c$ is determined in accordance with sub-clause 6.2B.3.2 with parameters applicable for UEs not indicating support of dynamicPowerSharing and MPR$_c$ = 0 dB;

For UEs indicating support of dynamicPowerSharing in the *UE-MRDC-Capability IE*, the UE can configure the total transmission power in accordance with sub-clause 6.2B.4.1.0.1.1 but with $P_{\text{powerclass,EN-DC}}$ the EN-DC power class of the intra-band non-contiguous band combination configured and A-MPR determined in accordance with sub-clause 6.2B.3.2.

The total maximum output power P_{UMAX} over both CGs is measured in accordance with sub-clause 6.2B.4.1.0.1.1 and shall be within the limits specified in sub-clause 6.2B.4.1.0.1.1 but with parameters applicable for the non-contiguous band combination configured.

The maximum output power levels $p_{UMAX,\text{c,E-UTRA}}$ *and* $p_{UMAX,\text{f,c,NR}}$ *for the CGs are measured in accordance with sub-clause 6.2B.4.1.0.1.1 and shall be within the limits specified in sub-clause 6.2B.4.1.0.1.1 but with parameters applicable for the non-contiguous band combination configured.*

6.2B.4.1.0.1.3 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, $\hat{P}^{EN-DC}_{Total}$.

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] sub-clause 6.2.5 modified by P_{LTE} as follows:

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

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

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

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

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

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

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

- P_{LTE} signalled by RRC as p-MaxEUTRA in [36.331]

- P_{NR} signalled by RRC as p-NR-FR1 defined in [38.331]

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

- $\Delta T_{\text{C\_NR},c}$ = 1.5dB when NOTE 3 in Table 6.2.1-1 in TS 38.101-1 [2] applies for a serving cell *c*, otherwise $\Delta T_{\text{C\_NR},c}$ = 0dB;

- $\Delta T_{IB,c}$ specified in sub-clause 6.2.7 for EN-DC, the individual Power Class defined in table 6.2B.1-3 and any other additional power reductions parameters specified in sub-clauses 6.2.3 and 6.2.4 for EN-DC are applicable to $P_{CMAX\_ E-UTRA,c}$ and $P_{CMAX\_ NR,c}$ evaluations.

If the transmissions from NR and E-UTRA do not overlap, then the complete sub-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 $P_{PowerClass, EN-DC}$ or $P_{EMAX, EN-DC}$ shall not be exceeded at any time by UE.

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

$$P\_EN\text{-}DC\_Total = MIN \{ P_{EMAX, EN-DC}, P_{PowerClass, EN-DC} - \Delta P_{PowerClass} \}$$

P_EN-DC_Total is the dB value of $\hat{P}_{Total}^{EN-DC}$, which is used in [38.213] and $P_{EMAX, EN-DC}$ is p-maxUE-FR1-r15 value signalled by RRC and defined in [36.331];

If the UE does not support dynamic power sharing,

$$P\_EN\text{-}DC\_Total = MIN \{ P_{EMAX, EN-DC}, P_{PowerClass, EN-DC} \} + 0.3 \text{ dB}$$

If the EN-DC UE does not support dynamic power sharing, then the complete sub-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_EN-DC_Total 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 $P_{CMAX\_ NR,c}$ 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.4.1.0.1.3-2.

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.4.1.0.1.3-1 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.4.1.0.1.3-1: P_{CMAX} evaluation window

transmission duration	T_{REF}	T_{eval}
Different transmission duration in different RAT carriers	LTE Subframe	Min($T_{no\_hopping}$, 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:

$$P_{CMAX\_H} = MAX \{ P_{CMAX\_ EN-DC\_H}(p,q), P_{CMAX\_ EN-DC\_H}(p,q+1), \ldots, P_{CMAX\_ EN-DC\_H}(p,q+n) \}$$

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

While P_{CMAX_L} is computed as follows:

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

where $P_{CMAX\_EN\text{-}DC\_L}$ 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_{eval} duration, where $q+n$ is the last NR UL physical-channel overlapping with LTE subframe p,

With

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

And:

a= $10 \log_{10} [p_{CMAX\_E\text{-}UTRA,c}(p) + p_{CMAX,f,c,NR}(q)] > P\_EN\text{-}DC\_Total$

b= $10 \log_{10} [p_{CMAX\_E\text{-}UTRA,c}(p) + p_{CMAX,f,c,NR}(q) / X\_scale] > P\_EN\text{-}DC\_Total$

If a= FALSE

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

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

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

ELSE If b= TRUE

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

where

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

Table 6.2B.4.1.0.1.3-2: P_{CMAX} tolerance for Dual Connectivity LTE-NR

P_{CMAX}(dBm)	Tolerance $T_{LOW}(P_{CMAX\_L})$ (dB)	Tolerance $T_{HIGH}(P_{CMAX\_H})$ (dB)
$23 \le P_{CMAX} \le 33$	[3.0]	[2.0]
$22 \le P_{CMAX} < 23$	[5.0]	[2.0]
$21 \le P_{CMAX} < 22$	[5.0]	[3.0]
$20 \le P_{CMAX} < 21$	[6.0]	[4.0]
$16 \le P_{CMAX} < 20$	[5.0]	
$11 \le P_{CMAX} < 16$	[6.0]	
$-40 \le P_{CMAX} < 11$	[7.0]	
NOTE 1: For UEs not indicating support of dynamic power sharing, the upper tolerance T_{high} shall be reduced by 0.3 dB for $P \ge 20$ dBm.		

When LTE 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, $P_{UMAX,f,c,NR}(q)$, under nominal conditions.

$$10\log(p_{CMAX\ L,f,c,,NR\ c}(q)/X\_scale) - T_{LOW}(10\log(p_{CMAX\ L,f,c,,NR\ c}(q)/X\_scale))\} \le P_{UMAX,f,c,NR}(q) \le 10\log(p_{CMAX\ H,f,c,,NR\ c}(q)) + T_{HIGH}(10\log(p_{CMAX\ H,f,c,,NR\ c}(q))).$$

with the tolerances T_{LOW} and T_{HIGH} for applicable values of P_{CMAX} specified in Table 6.2B.4.1.0.1.3-2.

6.2B.4.1.0.1.4 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 PCMAX,c(i),i for serving cell c(i) of CG i, i = 1,2.

The UE maximum configured power PCMAX,c(i), on E-UTRA for the subframe i shall be set according to subclause 6.2.5 from TS 36.101 [4]. Applicable inter-band ΔTIB,c parameters shall be used according to the subclauses 6.2B.4.1.0.2.4 or 6.2B.4.1.0.2.5.

The UE maximum configured power PCMAX,c(j), on NR for the slot j shall be set according to subclause 6.2.4 from TS 38.101-2 [3].

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

6.2B.4.1.0.1.5 Inter-band EN-DC including both FR1 and FR2

< equations for Pcmax >

6.2B.4.1.0.2 $\Delta T_{IB,c}$ for EN-DC

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

6.2B.4.1.0.2.1 Intra-band contiguous EN-DC

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

6.2B.4.1.0.2.2 Intra-band non-contiguous EN-DC

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

6.2B.4.1.0.2.3 Inter-band EN-DC within FR1

6.2B.4.1.0.2.3.1 $\Delta T_{IB,c}$ for EN-DC two bands

Table 6.2B.4.1.0.2.3.1-1: $\Delta T_{IB,c}$ due to EN-DC(two bands)

Inter-band EN-DC configuration	E-UTRA or NR Band	$\Delta T_{IB,c}$ (dB)
DC_1_n28		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	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
	n77	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
	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

Inter-band EN-DC configuration	E-UTRA or NR Band	$\Delta T_{IB,c}$ (dB)
	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
	n77	0.8
DC_25_n41	25	0.5
	n41	0.3[1]
		0.8[2]
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 2545-2690MHz. NOTE 2: The requirement is applied for UE transmitting on the frequency range of 2496-2545MHz.		

6.2B.4.1.0.2.3.2 $\Delta T_{IB,c}$ for EN-DC three bands

Table 6.2B.4.1.0.2.3.2-1: $\Delta T_{IB,c}$ 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	1	0.6
	7	0.6
	n78	0.8
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_1-1A_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_1-41_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_1-28_n77	1	0.3

Inter-band EN-DC configuration	E-UTRA or NR Band	$\Delta T_{IB,c}$ (dB)
	28	0.6
	n77	0.8
DC_1-28_n78	1	0.3
	28	0.6
	n78	0.8
DC_1_n28-n78	1	0.3
	n28	0.6
	n78	0.8
DC_1_n28-n79	1	0.3
	28	0.3
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_SUL_n78-n84	1	0.3
	n78	0.8
	n84	0.3
DC_1_n77-n79	1	0.6
	n77	0.8
	n79	0
DC_1_n78-n79	1	0.3
	n78	0.8
	n79	0.5
DC_2-(n)71	2	0.3
	71	0.3
	n71	
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_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

Inter-band EN-DC configuration	E-UTRA or NR Band	$\Delta T_{IB,c}$ (dB)
DC_3-19_n79	3	0.3
	19	0.3
DC_3-20_n28	3	0.3
	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[1]
		0.8[2]
	n78	0.8
DC_3-42_n77	3	0.6
	42	0.8
	n787	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
	n79	0
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_7-7_n78	7	0.5
	n78	0.8
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

Inter-band EN-DC configuration	E-UTRA or NR Band	$\Delta T_{IB,c}$ (dB)
	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
	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
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
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
DC_19_n77-n79	19	0.3
	n77	0.8
	n79	0
DC_19_n78-n79	19	0.3
	n78	0.8
	n79	0.5
DC_20_n8-n75	20	0.4
	n8	0.4
DC_20_n28-n75	20	0.5
	n28	0.7
DC_20_n28-n78	20	0.6
	n28	0.6
	n78	0.8
DC_20_n75-n78	20	0.5
	n78	0.8
DC_20_n76-n78	20	0.5
	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

Inter-band EN-DC configuration	E-UTRA or NR Band	$\Delta T_{IB,c}$ (dB)
DC_21-42_n79	21	0.4
	42	0.8
DC_21_n77-n79	21	0.4
	n77	0.8
	n79	0
DC_21_n78-n79	21	0.4
	n78	0.8
	n79	0.5
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.
	42	0.8
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_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 2545-2690MHz. NOTE 2: The requirement is applied for UE transmitting on the frequency range of 2496-2545MHz.		

6.2B.4.1.0.2.3.3 $\Delta T_{IB,c}$ for EN-DC four bands

Table 6.2B.4.1.0.2.3.3-1: $\Delta T_{IB,c}$ 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 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_1-3-28_n77	1	0.6
	3	0.6
	28	0.6
	n77	0.8
DC_1-3-28_n78	1	0.6
	3	0.6
	28	0.6
	n78	0.8
DC_1-3_n28-n78	1	0.6
	3	0.6
	n28	0.6
	n78	0.8
DC_1-3-28_n79	1	0.6
	3	0.6
	28	0.6
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
	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_1-3-42_n77	1	0.6
	3	0.6
	42	0.8
	n77	0.8
DC_1-3-42_n78	1	0.6
	3	0.6

Inter-band EN-DC configuration	E-UTRA or NR Band	$\Delta T_{IB,c}$ (dB)
	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 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
	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
	n78	0.8
DC_1-21-28_n77	1	0.6
	21	0.4
	28	0.6
	n77	0.8
DC_1-21-28_n78	1	0.3
	21	0.4
	28	0.6
	n78	0.8
DC_1-21-28_n79	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

Inter-band EN-DC configuration	E-UTRA or NR Band	$\Delta T_{IB,c}$ (dB)
	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
	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

Inter-band EN-DC configuration	E-UTRA or NR Band	$\Delta T_{IB,c}$ (dB)
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_3-28-42_n77	3	0.6
	28	0.5
	42	0.8
	n77	0.8
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_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_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.4.1.0.2.3.4 $\Delta T_{IB,c}$ for EN-DC five bands

Table 6.2B.4.1.0.2.3.4-1: $\Delta T_{IB,c}$ 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, 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
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

Inter-band EN-DC configuration	E-UTRA or NR Band	$\Delta T_{IB,c}$ (dB)
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
	n79	0
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
	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
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
DC_3-7-20_n28-n78	3	0.6

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

6.2B.4.1.0.2.3.5 $\Delta T_{IB,c}$ for EN-DC six bands

Table 6.2B.4.1.0.2.3.5-1: $\Delta T_{IB,c}$ 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.4.1.0.2.4 Inter-band EN-DC including FR2

6.2B.4.1.0.2.4.1 $\Delta T_{IB,c}$ 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 5.2B.5.1-1 is set to zero.

Table 6.2B.4.1.0.2.4.1-1: $\Delta T_{IB,c}$ due to EN-DC(two bands)

FFS

6.2B.4.1.0.2.4.2 $\Delta T_{IB,c}$ 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 5.2B.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.4.1.0.2.4.2-1: $\Delta T_{IB,c}$ due to EN-DC (three bands)

FFS

6.2B.4.1.0.2.4.3 $\Delta T_{IB,c}$ 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 5.2B.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 6.2B.4.1.0.2.4.3-1: $\Delta T_{IB,c}$ due to EN-DC(four bands)

FFS

6.2B.4.1.0.2.4.4 $\Delta T_{IB,c}$ 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 5.2B.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.4.1.0.2.4.4-1: $\Delta T_{IB,c}$ due to EN-DC (five bands)

FFS

6.2B.4.1.0.2.4.5 $\Delta T_{IB,c}$ for EN-DC six bands

FFS

6.2B.4.1.0.2.5 Inter-band EN-DC including both FR1 and FR2

6.2B.4.1.0.2.5.1 $\Delta T_{IB,c}$ for EN-DC three bands

Unless otherwise stated, for inter-band EN-DC configurations defined in table 5.2B.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.4.1.0.2.3.

Table 6.2B.4.1.0.2.5.1-1: $\Delta T_{IB,c}$ due to EN-DC (three bands)

FFS

6.2B.4.1.0.2.5.2 $\Delta T_{IB,c}$ for EN-DC four bands

Unless otherwise stated, for inter-band EN-DC configurations defined in table 5.2B.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.4.1.0.2.3.

6.2B.4.1.0.2.5.3 $\Delta T_{IB,c}$ for EN-DC five bands

Unless otherwise stated, for inter-band EN-DC configurations defined in table 5.2B.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.4.1.0.2.3.

6.2B.4.1.0.2.5.4 $\Delta T_{IB,c}$ for EN-DC six bands

Unless otherwise stated, for inter-band EN-DC configurations defined in table 5.2B.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.4.1.0.2.3.

6.2B.4.1.1 Configured Output Power Level for Intra-Band Contiguous EN-DC

Editor’s note: The following aspects are either missing or not yet determined:

- Test description is FFS.

- MU and TT are FFS.

6.2B.4.1.1.1 Test purpose

Editor’s Note: Explanatory test is needed.

6.2B.4.1.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC.

6.2B.4.1.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.2B.4.1.0.1.1.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

6.2B.4.1.1.4 Test description

6.2B.4.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC configuration specified in clause 5.3B.1.2 and are shown in table 6.2B.4.1.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 6.2B.4.1.1.4.1-1: Test configurations table for intra-band contiguous EN-DC

Initial Conditions					
Test Environment as specified in TS 38.508-1 [5] subclause 4.1		Normal, TL/VL, TL/VH, TH/VL, TH/VH			
NR Test Frequencies as specified in TS 38.508-1 [5] subclause 4.3.1 E-UTRA Test Frequencies as specified in TS 36.508-1 [11] subclause 4.3.1		Mid range			
Test EN-DC bandwidth combination as specified in TS 38.508-1 [5] subclause 4.3.1		Lowest N_{RB_agg}, Highest N_{RB_agg}			
NR Test SCS as specified in Table 5.3.5-1 in TS 38.521-1[8]		Highest supported SCS			
NR/E-UTRA Test Parameters					
Test ID	**Downlink Configuration**	**EN-DC Uplink Configuration**			
		E-UTRA Cell		**NR Cell**	
		Modulation	**RB allocation (NOTE 2)**	**Modulation**	**RB allocation (NOTE 1)**
1	N/A for Configured transmitted power testing.	QPSK	Outer_Full	CP-OFDM QPSK	Outer_Full
2		QPSK	Table 6.2B.4.1.1.4.1-2	DFT-s-OFDM QPSK	Inner Full
NOTE 1: The specific configuration of each RB allocation is defined in Table 6.1-1 in TS 38.521-1 [8]. NOTE 2: Outer_Full defined as the transmission bandwidth configuration N_{RB} per channel bandwidth for the E-UTRA component as indicated in TS 36.521-1 [10] Table 5.4.2-1.					

Table 6.2B.4.1.1.4.1-2: RB allocation table for LTE carrier

LTE Ch BW	RB allocation
5MHz	8@0
10MHz	12@0
15MHz	16@0
20MHz	18@0

1. Connect the SS to the UE antenna connectors as shown in [6] TS 38.508-1 A.3.1.2.1 for SS diagram and A.3.2.1 for UE diagram.
2. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] subclause 4.4.3.
3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0 and TS 38.521-1 [8] Annex C.0 for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.
4. The UL Reference Measurement channels are TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.
5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.
6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.2B.4.1.1.4.3.

6.2B.4.1.1.4.2 Test procedure

FFS

6.2B.4.1.1.4.3 Message contents

FFS

6.2B.4.1.1.5 Test requirement

FFS

6.2B.4.1.2 Configured Output Power for Intra-Band Non-Contiguous EN-DC

Editor's note: The following aspects are either missing or not yet determined:

- Test description is FFS.

- MU and TT are FFS.

6.2B.4.1.2.1 Test purpose

Editor's Note: Explanatory test is needed.

6.2B.4.1.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC.

6.2B.4.1.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.2B.4.1.0.1.2.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

6.2B.4.1.2.4 Test description

6.2B.4.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC configuration specified in clause 5.3B.1.2 and are shown in table 6.2B.4.1.2.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 6.2B.4.1.2.4.1-1: Test configurations table for intra-band contiguous EN-DC

<table>
<tr><th colspan="6">Initial Conditions</th></tr>
<tr><td colspan="2">Test Environment as specified in TS 38.508-1 [5] subclause 4.1</td><td colspan="4">Normal, TL/VL, TL/VH, TH/VL, TH/VH</td></tr>
<tr><td colspan="2">NR Test Frequencies and E-UTRA Test Frequencies as specified in TS 38.508-1 [5] subclause 4.3.1.</td><td colspan="4">Refer to test points
A: Maximum Wgap</td></tr>
<tr><td colspan="2">Test EN-DC bandwidth combination as specified in TS 38.508-1 [5] subclause 4.3.1</td><td colspan="4">Lowest N_{RB_agg}, Highest N_{RB_agg}</td></tr>
<tr><td colspan="2">NR Test SCS as specified in Table 5.3.5-1 in TS 38.521-1[8]</td><td colspan="4">Highest supported SCS</td></tr>
<tr><th colspan="6">NR/E-UTRA Test Parameters</th></tr>
<tr><th rowspan="3">Test ID</th><th rowspan="3">Downlink Configuration</th><th colspan="4">EN-DC Uplink Configuration</th></tr>
<tr><th colspan="2">E-UTRA Cell</th><th colspan="2">NR Cell</th></tr>
<tr><th>Modulation</th><th>RB allocation (NOTE 2)</th><th>Modulation</th><th>RB allocation (NOTE 1)</th></tr>
<tr><td>1</td><td rowspan="2">N/A</td><td>QPSK</td><td>Outer_Full</td><td>CP-OFDM QPSK</td><td>Outer_Full</td></tr>
<tr><td>2</td><td>QPSK</td><td>Table 6.2B.4.1.2.4.1-2</td><td>DFT-s-OFDM QPSK</td><td>Inner Full</td></tr>
<tr><td colspan="6">NOTE 1: The specific configuration of each RB allocation is defined in Table 6.1-1 in TS 38.521-1 [8].
NOTE 2: Outer_Full defined as the transmission bandwidth configuration NRB per channel bandwidth for the E-UTRA component as indicated in TS 36.521-1 [10] Table 5.4.2-1.</td></tr>
</table>

Table 6.2B.4.1.2.4.1-2: RB allocation table for LTE carrier

LTE Ch BW	RB allocation
5MHz	8@0
10MHz	12@0
15MHz	16@0
20MHz	18@0

1. Connect the SS to the UE antenna connectors as shown in [6] TS 38.508-1 A.3.1.2.1 for SS diagram and A.3.2.1 for UE diagram.

2. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] subclause 4.4.3.

3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0 and TS 38.521-1 [8] Annex C.0 for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.

4. The UL Reference Measurement channels are TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.

5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.2B.4.1.2.4.3.

6.2B.4.1.2.5 Test requirement

FFS

6.2B.4.1.3 Configured Output Power for Inter-Band EN-DC within FR1

Editor's note: The following aspects are either missing or not yet determined:

- Minimum requirements are pending RAN4.

- Test description is not complete.

6.2B.4.1.3.1 Test purpose

Editor's Note: Explanatory test is needed.

6.2B.4.1.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC within FR1.

6.2B.4.1.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 6.2B.4.1.0.1.3.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

6.2B.4.1.3.4 Test description

6.2B.4.1.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC configuration specified in clause 5.3B.1.2 and are shown in table 6.2B.4.1.3.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 6.2B.4.1.3.4.1-1: Test configurations table for intra-band contiguous EN-DC

Initial Conditions					
Test Environment as specified in TS 38.508-1 [5] subclause 4.1		Normal, TL/VL, TL/VH, TH/VL, TH/VH			
NR Test Frequencies as specified in TS 38.508-1 [5] subclause 4.3.1 E-UTRA Test Frequencies as specified in TS 36.508-1 [11] subclause 4.3.1		Mid range			
Test EN-DC bandwidth combination as specified in TS 38.508-1 [5] subclause 4.3.1		Lowest N_{RB_agg}, Highest N_{RB_agg}			
NR Test SCS as specified in Table 5.3.5-1 in TS 38.521-1[8]		Highest supported SCS			
NR/E-UTRA Test Parameters					
Test ID	**Downlink Configuration**	**EN-DC Uplink Configuration**			
		E-UTRA Cell		**NR Cell**	
		Modulation	**RB allocation**	**Modulation**	**RB allocation (NOTE 1)**
1	N/A for Configured transmitted power testing.	QPSK	Table 6.2B.4.1.3.4.1-2	DFT-s-OFDM QPSK	Inner Full
NOTE 1: The specific configuration of each RB allocation is defined in Table 6.1-1 in TS 38.521-1 [8].					

Table 6.2B.4.1.3.4.1-2: RB allocation table for LTE carrier

LTE Ch BW	RB allocation
5MHz	8@0
10MHz	12@0
15MHz	16@0
20MHz	18@0

1. Connect the SS to the UE antenna connectors as shown in [6] TS 38.508-1 A.3.1.2.1 for SS diagram and A.3.2.1 for UE diagram.

2. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] subclause 4.4.3.

3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0 and TS 38.521-1 [8] Annex C.0 for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.

4. The UL Reference Measurement channels are TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.

5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.2B.4.1.3.4.3.

6.2B.4.1.3.5 Test requirement

FFS

6.2B.4.1.4 Configured Output Power for Inter-Band EN-DC including FR2

Editor's note: The following aspects are either missing or not yet determined:

- Minimum requirements are pending RAN4.

- Test description is FFS.

- MU and TT are FFS.

6.2B.4.1.4.1 Test purpose

Editor's Note: Explanatory test is needed.

6.2B.4.1.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2.

6.2B.4.1.4.3 Minimum conformance requirements

FFS

The normative reference for this requirement is TS 38.101-3 [4] clause 6.2B.4.1.4.

6.2B.4.1.4.4 Test description

FFS

6.2B.4.1.4.5 Test requirement

FFS

6.2B.4.1.5 Configured Output Power for Inter-Band EN-DC including both FR1 and FR2

Editor's note: The following aspects are either missing or not yet determined:

- Minimum requirements are pending RAN4.

- Test description is FFS.

- MU and TT are FFS.

6.2B.4.1.5.1 Test purpose

Editor's Note: Explanatory test is needed.

6.2B.4.1.5.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including both FR1 and FR2.

6.2B.4.1.5.3 Minimum conformance requirements

FFS

The normative reference for this requirement is TS 38.101-3 [4] clause 6.2B.4.1.5.

6.2B.4.1.5.4 Test description

FFS

6.2B.4.1.5.5 Test requirement

FFS

6.2B.4.2 ΔTIB,c for EN-DC

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

6.2B.4.2.1 Intra-Band Contiguous EN-DC

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

6.2B.4.2.2 Intra-Band non-Contiguous EN-DC

$\Delta T_{IB,c}$ 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 bands

Table 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	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
	n77	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
	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

Inter-band EN-DC configuration	E-UTRA or NR Band	$\Delta T_{IB,c}$ (dB)
	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
	n77	0.8
DC_25_n41	25	0.5
	n41	0.3[1]
		0.8[2]
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 2545-2690MHz. NOTE 2: The requirement is applied for UE transmitting on the frequency range of 2496-2545MHz.		

6.2B.4.2.3.2 ΔTIB,c for EN-DC three bands

Table 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	1	0.6
	7	0.6
	n78	0.8
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_1-1A_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_1-41_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_1-28_n77	1	0.3

Inter-band EN-DC configuration	E-UTRA or NR Band	$\Delta T_{IB,c}$ (dB)
	28	0.6
	n77	0.8
DC_1-28_n78	1	0.3
	28	0.6
	n78	0.8
DC_1_n28-n78	1	0.3
	n28	0.6
	n78	0.8
DC_1_n28-n79	1	0.3
	28	0.3
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_SUL_n78-n84	1	0.3
	n78	0.8
	n84	0.3
DC_1_n77-n79	1	0.6
	n77	0.8
	n79	0
DC_1_n78-n79	1	0.3
	n78	0.8
	n79	0.5
DC_2-(n)71	2	0.3
	71	0.3
	n71	
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_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

Inter-band EN-DC configuration	E-UTRA or NR Band	$\Delta T_{IB,c}$ (dB)
DC_3-19_n79	3	0.3
	19	0.3
DC_3-20_n28	3	0.3
	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[1]
		0.8[2]
	n78	0.8
DC_3-42_n77	3	0.6
	42	0.8
	n787	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
	n79	0
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_7-7_n78	7	0.5
	n78	0.8
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

Inter-band EN-DC configuration	E-UTRA or NR Band	$\Delta T_{IB,c}$ (dB)
	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
	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
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
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
DC_19_n77-n79	19	0.3
	n77	0.8
	n79	0
DC_19_n78-n79	19	0.3
	n78	0.8
	n79	0.5
DC_20_n8-n75	20	0.4
	n8	0.4
DC_20_n28-n75	20	0.5
	n28	0.7
DC_20_n28-n78	20	0.6
	n28	0.6
	n78	0.8
DC_20_n75-n78	20	0.5
	n78	0.8
DC_20_n76-n78	20	0.5
	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

Inter-band EN-DC configuration	E-UTRA or NR Band	$\Delta T_{IB,c}$ (dB)
DC_21-42_n79	21	0.4
	42	0.8
DC_21_n77-n79	21	0.4
	n77	0.8
	n79	0
DC_21_n78-n79	21	0.4
	n78	0.8
	n79	0.5
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.
	42	0.8
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_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 2545-2690MHz. NOTE 2: The requirement is applied for UE transmitting on the frequency range of 2496-2545MHz.		

6.2B.4.2.3.3 ΔTIB,c for EN-DC four bands

Table 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 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_1-3-28_n77	1	0.6
	3	0.6
	28	0.6
	n77	0.8
DC_1-3-28_n78	1	0.6
	3	0.6
	28	0.6
	n78	0.8
DC_1-3_n28-n78	1	0.6
	3	0.6
	n28	0.6
	n78	0.8
DC_1-3-28_n79	1	0.6
	3	0.6
	28	0.6
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
	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_1-3-42_n77	1	0.6
	3	0.6
	42	0.8
	n77	0.8
DC_1-3-42_n78	1	0.6
	3	0.6

Inter-band EN-DC configuration	E-UTRA or NR Band	$\Delta T_{IB,c}$ (dB)
	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 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
	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
	n78	0.8
DC_1-21-28_n77	1	0.6
	21	0.4
	28	0.6
	n77	0.8
DC_1-21-28_n78	1	0.3
	21	0.4
	28	0.6
	n78	0.8
DC_1-21-28_n79	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

Inter-band EN-DC configuration	E-UTRA or NR Band	$\Delta T_{IB,c}$ (dB)
	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
	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

Inter-band EN-DC configuration	E-UTRA or NR Band	$\Delta T_{IB,c}$ (dB)
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_3-28-42_n77	3	0.6
	28	0.5
	42	0.8
	n77	0.8
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_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_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 ΔTIB,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, 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
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

Inter-band EN-DC configuration	E-UTRA or NR Band	$\Delta T_{IB,c}$ (dB)
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
	n79	0
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
	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
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
DC_3-7-20_n28-n78	3	0.6

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

6.2B.4.2.3.5 ΔTIB,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.4.2.4 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 5.2B.5.1-1 is set to zero.

Table 6.2B.4.2.4.1-1: $\Delta T_{IB,c}$ due to EN-DC(two bands)

FFS

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 5.2B.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: $\Delta T_{IB,c}$ due to EN-DC (three bands)

FFS

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 5.2B.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 6.2B.4.2.4.3-1: $\Delta T_{IB,c}$ due to EN-DC(four bands)

FFS

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 5.2B.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: $\Delta T_{IB,c}$ due to EN-DC (five bands)

FFS

6.2B.4.2.4.5 $\Delta T_{IB,c}$ for EN-DC six bands

Table 6.2B.4.2.4.5-1: $\Delta T_{IB,c}$ due to EN-DC (six bands)

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 5.2B.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: $\Delta T_{IB,c}$ due to EN-DC (three bands)

FFS

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 5.2B.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 5.2B.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 5.2B.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.

6.3 Output power dynamics

6.3B

6.3B.1 Minimum Output Power for EN-DC

6.3B.1.1 Minimum Output Power for intra-band contiguous EN-DC

Editor's note: The following aspects are either missing or not yet determined:

- Measurement uncertainty and TT is FFS.

  Working assumption: E-UTRA is not tested during test procedure

6.3B.1.1.1 Test purpose

Same test purpose as in clause 6.3.1.1 in TS 38.521-1 [8] for the NR carrier.

6.3B.1.1.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC.

6.3B.1.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.1.3 in TS 38.521-1 [8] for the NR carrier.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.3.

6.3B.1.1.4 Test description

Same test descriptions as in clause 6.3.1.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

Table 6.3B.1.1.4-1: Test configuration table

E-UTRA Test Parameters				
E-UTRA Channel Bandwidth	**E-UTRA Test Frequency**	**Downlink**	**Uplink**	
		N/A for min output power test	**Modulation**	**RB allocation**
5 MHz	MidRange		QPSK	25
NOTE 1: E-UTRA Test Frequency as specified in TS 36.508 [11] subclause 4.3.1				

For Initial conditions as in clause 6.3.1.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for the E-UTRA cell are set up according to TS36.508 [11] subclause 4.4.3 with E-UTRA channel bandwidth and test frequencies defined in Table 6.3B.1.1.4-1.

3.1. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4.1. The UL Reference Measurement channels are set according to Table 6.3B.1.1.4-1.

Step 6 of Initial conditions as in clause 6.3.1.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.3.1.4.2 in TS 38.521-1 [8] with the following steps added for E-UTRA component:

1.1. For E-UTRA component, SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to table 6.3B.1.1.4-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

2.1. For E-UTRA component, send continuously uplink power control "down" commands in every uplink scheduling information to the UE.

6.3B.1.1.5 Test requirements

Same test requirement as in clause 6.3.1.5 in TS 38.521-1 [8] for the NR carrier.

6.3B.1.2 Minimum output power for intra-band non-contiguous EN-DC

Editor's note: The following aspects are either missing or not yet determined:

- Minimum requirement are pending RAN4.

- Initial condition is not complete.

- Message contents are not complete.

- The test tolerance is not complete.

6.3B.1.2.1 Test purpose

Same test purpose as in clause 6.3.1.1 in TS 38.521-1 [8] for the NR carrier.

6.3B.1.2.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC.

6.3B.1.2.3 Minimum conformance requirements

FFS

The normative reference for this requirement is TS 38.101-1 [2] clause 6.3.

6.3B.1.2.4 Test description

6.3B.1.2.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and sub-carrier spacing based on NR operating bands specified in table [TBD]. All of these configurations shall be tested with applicable test parameters for each combination of test channel bandwidth and sub-carrier spacing, and are shown in table 6.3B.1.2.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes [TBD]. Configurations of PDSCH and PDCCH before measurement are specified in Annexes [TBD].

Table 6.3B.1.2.4.1-1: Test configuration table

<table>
<tr><th colspan="6">Initial Conditions</th></tr>
<tr><td colspan="2">Test Environment
as specified in TS 38.508-1 [6] subclause 4.1</td><td colspan="4">NC, TL/VL, TL/VH, TH/VL, TH/VH</td></tr>
<tr><td colspan="2">Test Frequencies
as specified in TS 38.508-1 [6] subclause 4.3.1</td><td colspan="4">TBD</td></tr>
<tr><td colspan="2">Test CC Combinations setting (N_{RB_agg})
as specified in TS 38.508-1 [6] subclause 4.3.1</td><td colspan="4">TBD</td></tr>
<tr><td colspan="2">Test SCS for the NR cell as specified in TS 38.508-1 [8] Table 5.3.5-1</td><td colspan="4">TBD</td></tr>
<tr><th colspan="6">Test Parameters</th></tr>
<tr><th rowspan="3">Test ID</th><th rowspan="3">Downlink Configuration</th><th colspan="4">EN-DC Uplink Configuration</th></tr>
<tr><th colspan="2">E-UTRA Cell</th><th colspan="2">NR Cell</th></tr>
<tr><th>Modulation</th><th>RB allocation</th><th>Modulation</th><th>RB allocation (Note 1)</th></tr>
<tr><td>1</td><td rowspan="4">N/A for min output power test</td><td>TBD</td><td>TBD</td><td rowspan="4">TBD</td><td rowspan="4">TBD</td></tr>
<tr><td>2</td><td>TBD</td><td>TBD</td></tr>
<tr><td>3</td><td>TBD</td><td>TBD</td></tr>
<tr><td>4</td><td>TBD</td><td>TBD</td></tr>
<tr><td colspan="6">NOTE 1: The specific configuration of each RB allocation is defined in Table 6.1-1.</td></tr>
</table>

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [6] Annex A, Figure A.3.1.1 for SS diagram and A.3.2.1 for UE diagram.
2. The parameter settings for the cell are set up according to [TBD].
3. Downlink signals are initially set up according to [TBD], and uplink signals according to [TBD].
4. The UL Reference Measurement channels are [TBD].
5. Propagation conditions are set according to [Annex B.0].
6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.3B.1.2.4.3.

6.3B.1.2.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format [0_1] for C_RNTI to schedule the UL RMC according to table 6.3B.1.2.4.1-1on both EN-DC component carriers. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

2. Send continuously uplink power control "down" commands to the UE for NR and E-UTRA carrier in every uplink scheduling information to the UE; allow at least 200ms to ensure that the UE transmits at its minimum output power.

3. Measure the mean power of the UE in the associated measurement bandwidth specified in Table 6.3B.1.2.5-1 for the specific channel bandwidth under test in the EN-DC. The period of the measurement shall be at least the continuous duration of one active sub-frame (1ms) and in the uplink symbols. For TDD slots with transient periods are not under test.

6.3B.1.2.4.3 Message contents

Message contents are according to TS 38.508-1 [6] subclause 4.6.1.

6.3B.1.2.5 Test requirements

FFS

6.3B.1.3 Minimum output power for inter-band EN-DC within FR1

6.3B.1.3.1 Test purpose

Same test purpose as in clause 6.3.1.1 in TS 38.521-1 [8] for the NR carrier.

6.3B.1.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC.

6.3B.1.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.1.3 in TS 38.521-1 [8] for the NR carrier.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.3.

6.3B.1.3.4 Test description

Same test descriptions as in clause 6.3.1.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

Table 6.3B.1.3.4-1: Test configuration table

E-UTRA Test Parameters				
E-UTRA Channel Bandwidth	**E-UTRA Test Frequency**	**Downlink**	**Uplink**	
		N/A for min output power test	**Modulation**	**RB allocation**
5 MHz	MidRange		QPSK	25
NOTE 1: E-UTRA Test Frequency as specified in TS 36.508 [11] subclause 4.3.1				

For Initial conditions as in clause 6.3.1.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for the E-UTRA cell are set up according to TS36.508 [11] subclause 4.4.3 with E-UTRA channel bandwidth and test frequencies defined in Table 6.3B.1.3.4-1.

3.1. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0.

4.1. The UL Reference Measurement channels are set according to Table 6.3B.1.3.4-1.

Step 6 of Initial conditions as in clause 6.3.1.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.3.1.4.2 in TS 38.521-1 [8] with the following steps added for E-UTRA component:

1.1. For E-UTRA component, SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to table 6.3B.1.3.4-1. Since the UE has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

2.1. For E-UTRA component, send continuously uplink power control "down" commands in every uplink scheduling information to the UE.

6.3B.1.3.5 Test requirements

Same test requirement as in clause 6.3.1.5 in TS 38.521-1 [8] for the NR carrier.

6.3B.1.4 Minimum Output Power for EN-DC Interband including FR2

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.3.1 in TS 38.521-2 is incomplete.
- Measurement Uncertainty and Test Tolerances are FFS.
- Measurement period is pending RAN4.
- The following aspects of the clause are for future consideration:
  - Testing of extreme conditions for FR2 is FFS.

6.3B.1.4.1 Test purpose

Same test purpose as in clause 6.3.1.1 in TS 38.521-2 [9] for the *NR* carrier.

6.3B.1.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2.

6.3B.1.4.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.1.3 in TS 38.521-2 [9] for the *NR* carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 subclause 6.3B.1.

6.3B.1.4.4 Test description

Same test description as in clause 6.3.1.4 in TS 38.521-2 [9] for the *NR* carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For initial conditions as in clause 6.3.1.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1 The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1 The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS36.521-1 [10].

Step 6 of initial conditions as in clause 6.3.1.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.3.1.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.3B.1.4.5 Test requirements

Same test requirement as in clause 6.3.1.5 in TS 38.521-2 [9] for the *NR* carrier.

6.3B.2 Transmit OFF Power for EN-DC

6.3B.2.1 Transmit OFF Power for intra-band contiguous EN-DC

Editor's note: The following aspects are either missing or not yet determined:

- Measurement uncertainty and TT is FFS.
- Initial condition & test procedure depends on Clause 6.3B.3 Tx ON/OFF time mask/PUCCH time mask for EN-DC, this test case is incomplete now

Editor's note: Working assumption: E-UTRA is not tested during test procedure

6.3B.2.1.1 Test purpose

Same test purpose as in clause 6.3.2.1 in TS 38.521-1 [8] for the NR carrier.

6.3B.2.1.2 Test applicability

The requirements of this test apply in Clause 6.3B.3 Tx ON/OFF time mask/PUCCH time mask to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC.

6.3B.2.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.2.3 in TS 38.521-1 [8] for the NR carrier.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.3.

6.3B.2.1.4 Test description

This test is covered by Clause 6.3B.3 Tx ON/OFF time mask/PUCCH time mask for EN-DC.

6.3B.2.1.5 Test requirements

Same test requirement as in clause 6.3.2.5 in TS 38.521-1 [8] for the NR carrier.

6.3B.2.2 Transmit OFF Power for intra-band non-contiguous EN-DC

Editor's note: The following aspects are either missing or not yet determined:

- Measurement uncertainty and TT is FFS.
- Initial condition & test procedure depends on Clause 6.3B.3 Tx ON/OFF time mask/PUCCH time mask for EN-DC, this test case is incomplete now

Editor's note: Working assumption: E-UTRA is not tested during test procedure

6.3B.2.2.1 Test purpose

Same test purpose as in clause 6.3.2.1 in TS 38.521-1 [8] for the NR carrier.

6.3B.2.2.2 Test applicability

The requirements of this test apply in Clause 6.3B.3 Tx ON/OFF time mask/PUCCH time mask to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC.

6.3B.2.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.2.3 in TS 38.521-1 [8] for the NR carrier.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.3.

6.3B.2.2.4 Test description

This test is covered by Clause 6.3B.3 Tx ON/OFF time mask/PUCCH time mask for EN-DC.

6.3B.2.2.5 Test requirements

Same test requirement as in clause 6.3.2.5 in TS 38.521-1 [8] for the NR carrier.

6.3B.2.3 Transmit OFF Power for inter-band EN-DC within FR1

Editor's note: The following aspects are either missing or not yet determined:

- Initial condition & test procedure depends on Clause 6.3B.3 Tx ON/OFF time mask/PUCCH time mask for EN-DC, this test case is incomplete now

Editor's note: Working assumption: E-UTRA is not tested during test procedure

6.3B.2.3.1 Test purpose

Same test purpose as in clause 6.3.2.1 in TS 38.521-1 [8] for the NR carrier.

6.3B.2.3.2 Test applicability

The requirements of this test apply in Clause 6.3B.3 Tx ON/OFF time mask/PUCCH time mask to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC.

6.3B.2.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.2.3 in TS 38.521-1 [8] for the NR carrier.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.3.

6.3B.2.3.4 Test description

This test is covered by Clause 6.3B.3 Tx ON/OFF time mask/PUCCH time mask for EN-DC.

6.3B.2.3.5 Test requirements

Same test requirement as in clause 6.3.2.5 in TS 38.521-1 [8] for the NR carrier.

6.3B.3 Tx ON/OFF time mask/PUCCH time mask for EN-DC

6.3B.3.1 Tx ON/OFF time mask for intra-band contiguous EN-DC

6.3B.3.1.1 Test purpose

Same test purpose as in clause 6.3.3.2.1 in TS 38.521-1 [8] for the NR carrier.

6.3B.3.1.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC.

6.3B.3.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.3.2.3 in TS 38.521-1 [8] for the NR carrier.

No exception requirements applicable to NR or LTE . LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.3.

6.3B.3.1.4 Test description

Same test descriptions as in clause 6.3.3.2.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1.

For Initial conditions as in clause 6.3.3.2.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for the E-UTRA cell are set up according to TS36.508 [11] subclause 4.4.3.

3.1. The E-UTRA Downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.3.3.2.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, *Connected without release On* according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.3.3.2.4.2 in TS 38.521-1 [8] with the following steps added for E-UTRA component:

1.1. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

6.3B.3.1.5 Test requirements

Same test requirement as in clause 6.3.3.2.5 in TS 38.521-1 [8] for the NR carrier.

6.3B.3.2 Tx ON/OFF time mask for intra-band non-contiguous EN-DC

6.3B.3.2.1 Test purpose

Same test purpose as in clause 6.3.3.2.1 in TS 38.521-1 [8] for the NR carrier.

6.3B.3.2.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC.

6.3B.3.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.3.2.3 in TS 38.521-1 [8] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.3.

6.3B.3.2.4 Test description

Same test descriptions as in clause 6.3.3.2.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1.

For Initial conditions as in clause 6.3.3.2.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for the E-UTRA cell are set up according to TS36.508 [11] subclause 4.4.3.

3.1. The E-UTRA Downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.3.3.2.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, *Connected without release On* according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.3.3.2.4.2 in TS 38.521-1 [8] with the following steps added for E-UTRA component:

1.1. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

6.3B.3.2.5 Test requirements

Same test requirement as in clause 6.3.3.2.5 in TS 38.521-1 [8] for the NR carrier.

6.3B.3.3 Tx ON/OFF time mask for inter-band EN-DC within FR1

6.3B.3.3.1 Test purpose

Same test purpose as in clause 6.3.3.2.1 in TS 38.521-1 [8] for the NR carrier.

6.3B.3.3.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC.

6.3B.3.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.3.2.3 in TS 38.521-1 [8] for the NR carrier.

No exception requirements applicable to NR or LTE.LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.3.

6.3B.3.3.4 Test description

Same test descriptions as in clause 6.3.3.2.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1.

For Initial conditions as in clause 6.3.3.2.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for the E-UTRA cell are set up according to TS36.508 [11] subclause 4.4.3.

3.1. The E-UTRA Downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.3.3.2.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, *Connected without release On* according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.3.3.2.4.2 in TS 38.521-1 [8] with the following steps added for E-UTRA component:

1.1. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

6.3B.3.3.5 Test requirements

Same test requirement as in clause 6.3.3.2.5 in TS 38.521-1 [8] for the NR carrier.

6.3B.4 PRACH time mask for EN-DC

Editor's note: The following aspects are either missing or not yet determined:

- Exceptions of test procedure and message content needed to initiate PRACH on NR carrier in EN-DC mode is still TBD

6.3B.4.1 PRACH time mask for intra-band contiguous EN-DC

6.3B.4.1.1 Test purpose

Same test purpose as in clause 6.3.3.4.1 in TS 38.521-1 [8] for the NR carrier.

6.3B.4.1.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC.

6.3B.4.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.3.4.3 in TS 38.521-1 [8] for the NR carrier.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.3B.4.1.4 Test description

Same test description as in clause 6.3.3.4.4 in TS 38.521-1 [8] with the following exception:

Table 6.3B.4.1.4-1: Test Configuration Table

Initial Conditions	
Test Frequencies as specified in TS 38.508-1 [6] subclause 4.3.1 for different DC bandwidth classes.	Mid range
Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE	Highest NRB_agg (NOTE 1)
NOTE 1: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same NRB_agg , only the combination with the highest NRB_SCG is tested	

The initial test configurations for E-UTRA as specified in Table 4.6-1 except for the parameters specified in Table 6.3B.4.1.4-1.

For Initial conditions as in clause 6.3.3.4.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 5 of Initial conditions as in clause 6.3.3.4.4.1 in TS 38.521-1 [8] is replaced by:

5. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

6.3B.4.1.5 Test requirements

Same test requirement as in clause 6.3.3.4.5 in TS 38.521-1 [8].

6.3B.4.2 PRACH Time Mask for intra-band non-contiguous EN-DC

Editor's note: The following aspects are either missing or not yet determined:

- Exceptions of test procedure and message content needed to initiate PRACH on NR carrier in EN-DC mode is still TBD

6.3B.4.2.1 Test purpose

Same test purpose as in clause 6.3.3.4.1 in TS 38.521-1 [8] for the NR carrier.

6.3B.4.2.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC.

6.3B.4.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.3.4.3 in TS 38.521-1 [8] for the NR carrier.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.3B.4.2.4 Test description

Same test description as in clause 6.3.3.4.4 in TS 38.521-1 [8] with the following exception:

Table 6.3B.4.2.4-1: Test Configuration Table

Initial Conditions	
Test Frequencies as specified in TS36TS38.508-1 [76] subclause 4.3.1 for different EN-DC bandwidth classes	[MaxWGap]
Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE	Highest NRB_agg (NOTE1)
NOTE 1: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same NRB_agg , only the combination with the highest NRB_SCG is tested	

The initial test configurations for E-UTRA as specified in Table 4.6-1 except for the parameters specified in Table 6.3B.4.2.4-1.

For Initial conditions as in clause 6.3.3.4.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 5 of Initial conditions as in clause 6.3.3.4.4.1 in TS 38.521-1 [8] is replaced by:

5. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

6.3B.4.2.5 Test requirements

Same test requirement as in clause 6.3.3.4.5 in TS 38.521-1 [8].

6.3B.4.3 PRACH Time Mask for inter-band EN-DC within FR1

6.3B.4.3.1 Test purpose

Same test purpose as in clause 6.3.3.4.1 in TS 38.521-1 [8] for the NR carrier.

6.3B.4.3.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC.

6.3B.4.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.3.3.4.3 in TS 38.521-1 [8] for the NR carrier.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.3B.4.3.4 Test description

Same test description as in clause 6.3.3.4.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1.For Initial conditions as in clause 6.3.3.4.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS36.521-1 [10].

Step 5 of Initial conditions as in clause 6.3.3.4.4.1 in TS 38.521-1 [8] is replaced by:

5. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

6.3B.4.3.5 Test requirements

Same test requirement as in clause 6.3.3.4.5 in TS 38.521-1 [8].

6.4 Transmit signal quality

6.4B

6.4B.1 Frequency error

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

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

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

6.4B.1.3.1 Test purpose

Same test purpose as in clause 6.4.1 in TS 38.521-1 [8] for the NR carrier.

6.4B.1.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC.

6.4B.1.3.3 Minimum conformance requirements

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 [5] and in clause 6.4.1 in [2], respectively, with all component carriers active. If multiple component carriers are assigned to one E-UTRA band, the requirements in subclauses 6.5.1A in [5] apply for those component carriers, and if multiple component carriers are assigned to one NR band, the requirements in subclauses 6.4A.1 in [2] apply for those component carriers.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this measurement is TS 38.101-3 [4] clause 6.4B.1.3.

6.4B.1.3.4 Test description

Same test description as in clause 6.4.1.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

Notes defined in Table 6.4.1.4.1-1 will be updated as below.

NOTE 2: REFSENS refers to Table 7.3B.2.3.4.1-2a to Table 7.3B.2.3.4.1-3m which defines uplink RB configuration and start RB location for each SCS, channel BW and NR band.

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1. For Initial conditions as in clause 6.4.1.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1[10].

Step 6 of Initial conditions as in clause 6.4.1.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508 [6] clause 4.5.

Step 3 of Test procedure as in clause 6.4.1.4.2 in TS 38.521-1 [8] is replaced by:

3. Set the Downlink signal level to the appropriate REFSENS value defined in Table 7.3B.2.3.5.1-1, 7.3B.2.3.5.2-1, and 7.3B.2.3.5.5-1. Send continuously uplink power control "up" commands to the UE in every uplink scheduling information to the UE so that the UE transmits at P_{UMAX} level for the duration of the test. Allow at least 200ms starting from the first TPC command in this step for the UE to reach P_{UMAX} level.

6.4B.1.3.5 Test Requirement

The 20 frequency error Δf results must fulfil the test requirement defined in 6.4.1.5 TS 38.521-1 [8].

6.4B.1.3.6 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC.

6.4B.1.4

6.4B.1.5 Frequency Error for inter-band EN-DC including FR2

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

The referred test case 6.4.1 in TS 38.521-2 is incomplete.

Testing of extreme conditions for FR2 is FFS.

RAN4 to confirm that RAN5 interpretation of the conformance requirement is correct that an UE passes the frequency error test in FR2 when the requirement is fulfilled for at least one polarization.

The following aspects of the clause are for future consideration:

- Testing of extreme conditions for FR2 is FFS.
- Potential update based on RAN4 response on RAN5 interpretation of the conformance requirement: Is it correct that a UE passes the frequency error test in FR2 when the requirement is fulfilled for at least one polarization.

6.4B.1.5.1 Test purpose

Same test purpose as in clause 6.4.1.1 in TS 38.521-2 [9] for the *NR* carrier.

6.4B.1.5.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting intra-band EN-DC including FR2.

6.4B.1.5.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.4.1.3 in TS 38.521-2 [9] for the *NR* carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.

6.4B.1.5.4 Test description

Same test description as in clause 6.4.1.4 in TS 38.521-2 [9] for the *NR* carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For initial conditions as in clause 6.4.1.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1 The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1 The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4.1.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.4.1.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.4B.1.5.5 Test requirements

Same test requirement as in clause 6.4.1.5 in TS 38.521-2 [9] for the *NR* carrier.

6.4B.2

6.4B.2.1 Transmit Modulation Quality for intra-band contiguous EN-DC

6.4B.2.1.1 Error Vector Magnitude for intra-band contiguous EN-DC

6.4B.2.1.1.1 Test purpose

The Error Vector Magnitude is a measure of the difference between the reference waveform and the measured waveform. This difference is called the error vector. Before calculating the EVM the measured waveform is corrected by the sample timing offset and RF frequency offset. Then the carrier leakage shall be removed from the measured waveform before calculating the EVM.

The measured waveform is further equalised using the channel estimates subjected to the EVM equaliser spectrum flatness requirement specified in sub-clause 6.4B.2.1.4.3. For DFT-s-OFDM waveforms, the EVM result is defined after the front-end FFT and IDFT as the square root of the ratio of the mean error vector power to the mean reference power expressed as a %. For CP-OFDM waveforms, the EVM result is defined after the front-end FFT as the square root of the ratio of the mean error vector power to the mean reference power expressed as a %.

The basic EVM measurement interval in the time domain is one preamble sequence for the PRACH and the duration of PUCCH/PUSCH channel, or one hop, if frequency hopping is enabled for PUCCH and PUSCH in the time domain. The EVM measurement interval is reduced by any symbols that contains an allowable power transient as defined in subclause 6.3.3.3 of [8].

6.4B.2.1.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band EN-DC.

6.4B.2.1.1.3 Minimum conformance requirements

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 [5] for the MCG and 6.4.2 of [2] for the SCG with EN-DC configured.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.2.1.1.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.4B.2.1.1.4 Test description

Same test description as in clause 6.4.2.1.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

Table 6.4B.2.1.1.4-1: Test Configuration Table

Initial Conditions	
Test Frequencies as specified in TS 38.508-1 [6] subclause 4.3.1	Mid range
Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1	Highest NRB_agg (NOTE 1)
NOTE 1: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same NRB_agg , only the combination with the highest NRB_SCG is tested.	

The initial test configurations for E-UTRA as specified in Table 4.6-1 except for the parameters specified in Table 6.4B.2.1.1.4-1.

For Initial conditions as in clause 6.4.2.1.4.1 in TS 38.521-1 [8], the following steps are added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4.2.1.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

Same test procedure as in clause 6.4.2.1.4.2 in TS 38.521-1 [8] and test procedures for PUCCH and PRACH are not applicable.

6.4B.2.1.1.5 Test requirements

Same test requirement as in clause 6.4.2.1.5 in TS 38.521-1 [8] for the NR carrier.

6.4B.2.1.2 Carrier Leakage for intra-band contiguous EN-DC

Editor's note: The following aspects are either missing or not yet determined:

- TP analysis is TBD.

6.4B.2.1.2.1 Test purpose

Carrier leakage expresses itself as unmodulated sine wave with the carrier frequency or centre frequency of aggregated transmission bandwidth configuration. It is an interference of approximately constant amplitude and independent of the amplitude of the wanted signal. Carrier leakage interferes with the centre sub carriers of the UE under test (if allocated), especially, when their amplitude is small. The measurement interval is defined over one slot in the time domain.

The purpose of this test is to exercise the UE transmitter to verify its modulation quality in terms of carrier leakage.

6.4B.2.1.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band EN-DC.

6.4B.2.1.2.3 Minimum conformance requirements

The carrier leakage requirements for each CG are according to clause 6.5.2 of [5] for the MCG and 6.4.2 of [2] for the SCG with EN-DC configured.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.2.1.2.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.4B.2.1.2.4 Test description

Same test description as in clause 6.4.2.2.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

Table 6.4B.2.1.2.4-1: Test Configuration

Initial Conditions	
Test Frequencies as specified in TS 38.508-1 [6] subclause 4.3.1	Mid range
Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1	Highest NRB_agg (NOTE 1)
NOTE 1: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same NRB_agg , only the combination with the highest NRB_SCG is tested.	

The initial test configurations for E-UTRA as specified in Table 4.6-1 except for the parameters specified in Table 6.4B.2.1.2.4-1For Initial conditions as in clause 6.4.2.2.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4.2.2.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

6.4B.2.1.2.5 Test requirements

Same test requirement as in clause 6.4.2.2.5 in TS 38.521-1 [8] for the NR carrier.

6.4B.2.1.3 In-band Emissions for intra-band contiguous EN-DC

Editor's note: The following aspects are either missing or not yet determined:

- TP analysis is TBD.

6.4B.2.1.3.1 Test purpose

The in-band emissions are a measure of the interference falling into the non-allocated resources blocks.

The in-band emission is defined as the average emission across 12 sub-carriers and as a function of the RB offset from the edge of the allocated UL transmission bandwidth. The in-band emission is measured as the ratio of the UE output power in a non–allocated RB to the UE output power in an allocated RB.

The basic in-band emissions measurement interval is defined over one slot in the time domain, however, the minimum requirement applies when the in-band emission measurement is averaged over 10 sub-frames. When the PUSCH or PUCCH transmission slot is shortened due to multiplexing with SRS, the in-band emissions measurement interval is reduced by one or more symbols, accordingly.

The purpose of this test is to exercise the UE transmitter to verify its modulation quality in terms of in-band emissions.

6.4B.2.1.3.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC.

6.4B.2.1.3.3 Minimum conformance requirements

For the MCG the in-band emission requirements in Table 6.5.2A.3.1-1 and 6.5.2A.3.1-2 in [5] 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 6.5.2A.3.1-1 and 6.5.2A.3.1-2 in [5] 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.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.2.1.3

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

6.4B.2.1.3.4 Test description

6.4B.2.1.3.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and test channel bandwidths based on NR operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC combination of test channel bandwidth and sub-carrier spacing, and are shown in table 6.4B.2.1.3.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521.1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 6.4B.2.1.3.4.1-1: Test configuration table

Initial Conditions					
Test Environment as specified in TS 38.508-1 [6] subclause 4.1		NC			
Test Frequencies as specified in TS 38.508-1 [6] subclause 4.3.1		Low range, Mid range, High range			
Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1		Lowest NRB_agg, Highest NRB_agg (Note 2)			
Test SCS for the NR cell as specified in TS 38.521-1 [8] Table 5.3.5-1		Smallest supported SCS per Channel Bandwidth			
Test Parameters					
Test ID	**Downlink Configuration**	**EN-DC Uplink Configuration**			
		E-UTRA Cell		**NR Cell**	
		Modulation	**RB allocation**	**Modulation**	**RB allocation (Note 1)**
1 (Note3)	N/A for In-band emission test	QPSK	0	DFT-s-OFDM QPSK	Inner_1RB_Left
2 (Note 4)		QPSK	0	DFT-s-OFDM QPSK	Inner_1RB_Right
3 (Note3)		QPSK	0	CP-OFDM QPSK	Inner_1RB_Left
4 (Note 4)		QPSK	0	CP-OFDM QPSK	Inner_1RB_Right
5 (Note3)		QPSK	Outer_1RB_Right	DFT-s-OFDM QPSK	0
6 (Note 4)		QPSK	Outer_1RB_Left	DFT-s-OFDM QPSK	0

NOTE 1: The specific configuration of each RB allocation is defined in Table 6.1-1 in TS 38.521-1 [8].
NOTE 2: If the UE supports multiple CC combinations in the EN-DC configuration with the same N_{RB_agg}, select the combination to test as follows:
- Lowest ENBW: NR component with lowest N_{RB} is tested.
- Highest ENBW: NR component with highest N_{RB} is tested.

NOTE 3: Applicable when E-UTRA cell carrier frequency is lower than NR cell carrier.
NOTE 4: Applicable when NR cell carrier frequency is lower than E-UTRA cell carrier.
NOTE 5: Outer_1RB_Left defined as 1 RB allocated at the left edge of the E-UTRA component. Outer_1RB_Right defined as 1 RB allocated at the right edge of the E-UTRA component.

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operation band and test channel bandwidth as specified in Table 4.6-1.

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [6] Annex A, Figure A.3.1.1 for TE diagram and section A.3.2.1 for UE diagram.

2. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] subclause 4.4.3.

3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0 and TS 38.521-1 [8] Annex C.0 for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.

4. NR downlink signals are initially set up according to Annex C.0, C.1, and C.2 and uplink signals according to Annex G.0, G.1, G.2, and G.3.0 of TS 38.521-1[8].

5. The UL Reference Measurement channels are TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.

6. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.

7. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.4B.2.1.3.4.3.

8. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

6.4B.2.1.3.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 6.4B.2.1.3.4.1-1 on E-UTRA CC and NR CC respectively. Since the UL has no payload and no loopback data to send, the UE transmits uplink MAC padding bits on the UL RMC.

2. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is 0 + P_W dBm ± P_W dB where P_W is the power window according to Table 6.4B.2.1.3.4.2-1 for the carrier frequency f and the channel bandwidth BW on NR CC.

3. Measure In-band emission on NR CC using Global In-Channel Tx-Test (Annex E). Measure power spectral density on E-UTRA CC. For TDD slots with transient periods are not under test.

4. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is -30 + P_W dBm ± P_W dB where P_W is the power window according to Table 6.4B.2.1.3.4.2-2 for the carrier frequency f and the channel bandwidth BW on NR CC.

5. Measure In-band emission on NR CC using Global In-Channel Tx-Test (Annex E). Measure power spectral density on E-UTRA CC. For TDD slots with transient periods are not under test

6. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is -40 + P_W dBm ± P_W dB where P_W is the power window according to 6.4B.2.1.3.4.2-2 for the carrier frequency f and the channel bandwidth BW on NR CC.

7. Measure In-band emission on NR CC using Global In-Channel Tx-Test (Annex E). Measure power spectral density on E-UTRA CC. For TDD slots with transient periods are not under test.

8. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is 3.2 dBm ±3.2dB for carrier frequency $f \leq 3.0$GHz or 3.5dBm ±3.5 dB for carrier frequency $3.0\text{GHz} < f \leq 4.2\text{GHz}$ on E-UTRA CC.

9. Measure In-band emission on E-UTRA CC using Global In-Channel Tx-Test (Annex E). Measure power spectral density on NR CC. For TDD slots with transient periods are not under test.

10. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is -26.8 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -26.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz on E-UTRA CC.
11. Measure In-band emission on E-UTRA CC using Global In-Channel Tx-Test (Annex E). Measure power spectral density on NR CC. For TDD slots with transient periods are not under test
12. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is to -36.8 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -36.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz on E-UTRA CC.
13. Measure In-band emission on E-UTRA CC using Global In-Channel Tx-Test (Annex E). Measure power spectral density on NR CC. For TDD slots with transient periods are not under test.

NOTE 1: When switching to DFT-s-OFDM waveform, as specified in the test configuration table 6.4B.2.1.3.4.1-1, send an NR RRCReconfiguration message according to TS 38.508-1 [5] clause 4.6.3 Table 4.6.3-118 PUSCH-Config without CP-OFDM condition. When switching to CP-OFDM waveform, send an NR RRCReconfiguration message with CP-OFDM condition.

Table 6.4B.2.1.3.4.2-1: Power Window (dB) for carrier leakage (steps 2)

	f ≤ 3GHz	3GHz < f ≤ 4.2GHz	4.2GHz < f ≤ 6GHz
BW ≤ 20MHz	[1.4]	[1.7]	[2]
20MHz < BW ≤ 40MHz	[1.4]	[1.7]	[2.2]
40MHz < BW ≤ 100MHz	[2.1]	[2.3]	[2.3]

Table 6.4B.2.1.3.4.2-2: Power Window (dB) for carrier leakage (steps 4 and 6)

	f ≤ 3GHz	3GHz < f ≤ 4.2GHz	4.2GHz < f ≤ 6GHz
BW ≤ 40MHz	[1.7]	[2.0]	[2.2]
40MHz < BW ≤ 100MHz	[2.1]	[2.3]	[2.5]

6.4B.2.1.3.4.3 Message contents

Message contents are according to TS 38.508-1 [6] subclause 4.6.1.

6.4B.2.1.3.5 Test requirements

Each of the [20] In-band emissions results, derived in Annex E.4.3 shall not exceed the corresponding values in Table 6.4B.2.1.3.5-1.

Table 6.4B.2.1.3.5-1: Test requirements for in-band emissions (allocated component carrier)

Parameter	Unit	Limit		Applicable Frequencies
General	dB	$\max\{-25-10\cdot\log_{10}(N_{RB}/L_{CRB}),\ 20\cdot\log_{10}EVM-3-5\cdot(\lvert\Delta_{RB}\rvert-1)/L_{CRB},\ -57\,dBm/180\,kHz-P_{RB}\}$ + TT		Any non-allocated (NOTE 2)
IQ Image	dB	-25		Exception for IQ image (NOTE 3)
Carrier leakage	dBc	25 + TT	Output power > 0 dBm	Exception for Carrier frequency (NOTE 4)
		20 + TT	-30 dBm ≤ Output power ≤ 0 dBm	
		10 + TT	-40 dBm ≤ Output power < -30 dBm	

NOTE 1: An in-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the minimum requirement is calculated as the higher of P_{RB} - 30 dB and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply. P_{RB} is defined in NOTE 9. The limit is evaluated in each non-allocated RB.

NOTE 2: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured average power per allocated RB, where the averaging is done across all allocated RBs

NOTE 3: Exceptions to the general limit are allowed for up to L_{CRBs} +1 RBs within a contiguous width of L_{CRBs} +1 non-allocated RBs. The measurement bandwidth is 1 RB.

NOTE 4: Exceptions to the general limit are allowed for up to two contiguous non-allocated RBs. The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in the non-allocated RB to the measured total power in all allocated RBs.

NOTE 5: L_{CRB} is the Transmission Bandwidth (see Figure 5.6-1) not exceeding $\lfloor N_{RB}/2-1 \rfloor$

NOTE 6: N_{RB} is the Transmission Bandwidth Configuration (see Figure 5.6-1) of the component carrier with RBs allocated.

NOTE 7: EVM is the limit specified in Table 6.5.2.1.1-1 for the modulation format used in the allocated RBs.

NOTE 8: Δ_{RB} is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g. $\Delta_{RB}=1$ or $\Delta_{RB}=-1$ for the first adjacent RB outside of the allocated bandwidth).

NOTE 9: P_{RB} is the transmitted power per 180 kHz in allocated RBs, measured in dBm.

NOTE 10: Test tolerance TT = 0.8 dB.

The in-band emissions results, measured with the spectral test shall not exceed the corresponding values in Table 6.4B.2.1.3.5-2.

Table 6.4B.2.1.3.5-2: Test requirements for in-band emissions (not allocated component carrier)

<table>
<tr><th>Para-meter</th><th>Unit</th><th>Meas BW NOTE 1</th><th colspan="2">Limit</th><th>remark</th><th>Applicable Frequencies</th></tr>
<tr><td>General</td><td>dB</td><td>BW of 1 RB (180KHz rectangular)</td><td colspan="2">$\max\{ -25-10\cdot\log_{10}(N_{RB}/L_{CRB}),$
$20\cdot\log_{10} EVM -3-5\cdot(\lvert\Delta_{RB}\rvert-1)/L_{CRB},$
$-57\ dBm/180\,kHz - P_{RB}\}$</td><td>The reference value is the average power per allocated RB in the allocated component carrier</td><td>Any RB in the non allocated component carrier. The frequency raster of the RBs is derived when this component carrier is allocated with RBs</td></tr>
<tr><td>IQ Image</td><td>dB</td><td>BW of 1 RB (180KHz rectangular)</td><td colspan="2">-25 + TT

NOTE 2</td><td>The reference value is the average power per allocated RB in the allocated component carrier</td><td>The frequencies of the L_{CRB} contiguous non-allocated RBs are unknown. The frequency raster of the RBs is derived when this component carrier is allocated with RBs</td></tr>
<tr><td rowspan="4">Carrier leakage</td><td rowspan="4">dBc</td><td rowspan="4">BW of 1 RB (180KHz rectangular)</td><td colspan="2">NOTE 3</td><td rowspan="4">The reference value is the total power of the allocated RBs in the allocated component carrier</td><td rowspan="4">The frequencies of the up to 2 non-allocated RBs are unknown. The frequency raster of the RBs is derived when this component carrier is allocated with RBs</td></tr>
<tr><td>-25 + TT</td><td>Output power > 0 dBm</td></tr>
<tr><td>-20 + TT</td><td>-30 dBm ≤ Output power ≤ 0 dBm</td></tr>
<tr><td>-10 + TT</td><td>-40 dBm ≤ Output power < -30 dBm</td></tr>
<tr><td colspan="7">NOTE 1: Resolution BWs smaller than the measurement BW may be integrated to achieve the measurement bandwidth.
NOTE 2: Exceptions to the general limit is are allowed for up to L_{CRB} +1 RBs within a contiguous width of L_{CRB} +1 non-allocated RBs.
NOTE 3: Two Exceptions to the general limit are allowed for up to two contiguous non-allocated RBs
NOTE 4: NOTES 1, 5, 6, 7, 8, 9 from Table 6.5.2A.3.1-1 apply for Table 6.5.2A.3.1-2 as well.
NOTE 5: Δ_{RB} for measured non-allocated RB in the non allocated component carrier may take non-integer values when the carrier spacing between the CCs is not a multiple of RB.
NOTE 6: Test tolerance TT = 0.8 dB.</td></tr>
</table>

6.4B.2.2 Transmit Modulation Quality for intra-band non-contiguous EN-DC

Editor's Note: Wgap is TBD in TS 38.101-3 for this test case

6.4B.2.2.1 Error Vector Magnitude for intra-band non-contiguous EN-DC

6.4B.2.2.1.1 Test purpose

Same test purpose as in clause 6.4.2.1.1 in TS 38.521-1 [8] for the NR carrier.

6.4B.2.2.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC.

6.4B.2.2.1.3 Minimum conformance requirements

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 6.5.2.1 of [5] for the MCG and 6.4.2.1.3 of [8] for the SCG with EN-DC configured.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.2.2.1.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.4B.2.2.1.4 Test description

Same test description as in clause 6.4.2.1.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1.For Initial conditions as in clause 6.4.2.1.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4.2.1.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

Same test procedure as in clause 6.4.2.1.4.2 in TS 38.521-1 [8] and test procedures for PUCCH and PRACH are not applicable.

6.4B.2.2.1.5 Test requirement

Same test requirement as in clause 6.4.2.1.5 in TS 38.521-1 [8] for the NR carrier.

6.4B.2.2.2 Carrier Leakage for intra-band non-contiguous EN-DC

6.4B.2.2.2.1 Test purpose

Same test purpose as in clause 6.4.2.2.1 in TS 38.521-1 [8] for the NR carrier.

6.4B.2.2.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC.

6.4B.2.2.2.3 Minimum conformance requirements

The carrier leakage requirements for each CG are according to clause 6.5.2.2 of [5] for the MCG and 6.4.2.2.3 of [8] for the SCG with EN-DC configured and PRB allocation only in the CG being measured.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.2.2.2.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.4B.2.2.2.4 Test description

Same test description as in clause 6.4.2.2.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1.

For Initial conditions as in clause 6.4.2.2.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4.2.2.4.1 in TS 38.521-1 [8] is replaced by the following two steps:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

6.4B.2.2.2.5 Test requirement

Same test requirement as in clause 6.4.2.2.5 in TS 38.521-1 [8] for the NR carrier.

6.4B.2.2.3 In-band Emissions for intra-band non-contiguous EN-DC

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- Measurement uncertainty and TT is FFS.

6.4B.2.2.3.1 Test purpose

Same test purpose as in clause 6.4.2.3.1 in TS 38.521-1 [8] for the NR carrier.

6.4B.2.2.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC.

6.4B.2.2.3.3 Minimum conformance requirements

For the MCG the in-band emission requirements in Table 6.5.2A.3.1-1 and 6.5.2A.3.1-2 in [5] 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 6.5.2A.3.1-1 and 6.5.2A.3.1-2 in [5] 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.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.2.2.3.

No exception requirements applicable to NR or LTE.

6.4B.2.2.3.4 Test description

6.4B.2.2.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and test channel bandwidths based on NR operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC combination of test channel bandwidth and sub-carrier spacing, and are shown in table 6.4B.2.2.3.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annexes A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521.1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 6.4B.2.2.3.4-1: Test Configuration Table

Initial Conditions					
Test Environment as specified in TS 38.508-1 [6] subclause 4.1		NC			
Test Frequencies as specified in TS 38.508-1 [6] subclause 4.3.1		Low range, Mid range, High range			
Test EN-DC bandwidth combination as specified in Table 5.3B.1.3-1		Lowest, Mid, Highest			
Test SCS for the NR cell as specified in TS 38.521-1 [8] Table 5.3.5-1		Smallest supported SCS per Channel Bandwidth			
Test Parameters					
Test ID	**Downlink Configuration**	**EN-DC Uplink Configuration**			
		E-UTRA Cell		**NR Cell**	
		Modulation	**RB allocation (NOTE 3)**	**Modulation**	**RB allocation (NOTE 1,2)**
1	N/A for carrier leakage testing	QPSK	0	DFT-s-OFDM QPSK	Inner_1RB_Left
2		QPSK	0	DFT-s-OFDM QPSK	Inner_1RB_Right
3		QPSK	0	CP-OFDM QPSK	Inner_1RB_Left
4		QPSK	0	CP-OFDM QPSK	Inner_1RB_Right
5		QPSK	Outer_1RB_Left	DFT-s-OFDM QPSK	0
6		QPSK	Outer_1RB_Right	DFT-s-OFDM QPSK	0
NOTE 1: The specific configuration of each RB allocation is defined in Table 6.1-1 in TS 38.521-1 [8]. NOTE 2: When the signalled DC carrier position is at Inner_1RB_Left, use Inner_1RB_Right for UL RB allocation. NOTE 3: Outer_1RB_Left defined as 1 RB allocated at the left edge of the E-UTRA component. Outer_1RB_Right defined as 1 RB allocated at the right edge of the E-UTRA component.					

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [6] Annex A, in Figure A.3.1.1.1 for TE diagram and section A.3.2.1 for UE diagram.

2. The parameter settings for NR cell are set up according to TS 38.508-1 [6] subclause 4.4.3.

3. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS36.521-1[10].

4. NR downlink signals are initially set up according to Annex C.0, C.1, and C.2 and uplink signals according to Annex G.0, G.1, G.2, and G.3.0 of TS38.521-1[8].

5. E-UTRA downlink signals are initially set up according to Annex C.0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0 of TS36.521-1[10].

6. The UL Reference Measurement channels are TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.

7. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.

8. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.4B.2.2.3.4.3.

9. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

6.4B.2.2.3.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 6.4B.2.2.3.4.1-1 on E-UTRA CC and NR CC

respectively. Since the UL has no payload and no loopback data to send, the UE transmits uplink MAC padding bits on the UL RMC.

2. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is 0 + P_W dBm ± P_W dB where P_W is the power window according to Table 6.4B.2.2.3.4.2-1 for the carrier frequency f and the channel bandwidth BW on NR CC.

3. Measure In-band emission on NR CC using Global In-Channel Tx-Test (Annex E). Measure power spectral density on E-UTRA CC. For TDD slots with transient periods are not under test.

4. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is -30 + P_W dBm ± P_W dB where P_W is the power window according to Table 6.4B.2.2.3.4.2-2 for the carrier frequency f and the channel bandwidth BW on NR CC.

5. Measure In-band emission on NR CC using Global In-Channel Tx-Test (Annex E). Measure power spectral density on E-UTRA CC. For TDD slots with transient periods are not under test

6. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is -40 + P_W dBm ± P_W dB where P_W is the power window according to 6.4B.2.2.3.4.2-2 for the carrier frequency f and the channel bandwidth BW on NR CC.

7. Measure In-band emission on NR CC using Global In-Channel Tx-Test (Annex E). Measure power spectral density on E-UTRA CC. For TDD slots with transient periods are not under test.

8. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is 3.2 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or 3.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz on E-UTRA CC.

9. Measure In-band emission on E-UTRA CC using Global In-Channel Tx-Test (Annex E). Measure power spectral density on NR CC. For TDD slots with transient periods are not under test.

10. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is -26.8 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -26.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz on E-UTRA CC.

11. Measure In-band emission on E-UTRA CC using Global In-Channel Tx-Test (Annex E). Measure power spectral density on NR CC. For TDD slots with transient periods are not under test

12. Send the appropriate TPC commands in the uplink scheduling information to the UE until UE output power is to -36.8 dBm ±3.2dB for carrier frequency f ≤ 3.0GHz or -36.5dBm ±3.5 dB for carrier frequency 3.0GHz < f ≤ 4.2GHz on E-UTRA CC.

13. Measure In-band emission on E-UTRA CC using Global In-Channel Tx-Test (Annex E). Measure power spectral density on NR CC. For TDD slots with transient periods are not under test.

NOTE 1: When switching to DFT-s-OFDM waveform, as specified in the test configuration table 6.4B.2.2.3.4.1-1, send an NR RRCConnectionReconfiguration message containing NR RRCReconfiguration message according to TS 38.508-1 [6] clause 4.6.3 Table 4.6.3-118 PUSCH-Config without CP-OFDM condition. When switching to CP-OFDM waveform, send an RRCConnectionReconfiguration message containing NR RRCReconfiguration message with CP-OFDM condition.

Table 6.4B.2.2.3.4.2-1: Power Window (dB) for carrier leakage (step 2)

	f ≤ 3GHz	3GHz < f ≤ 4.2GHz	4.2GHz < f ≤ 6GHz
BW ≤ 20MHz	[1.4]	[1.7]	[2]
20MHz < BW ≤ 40MHz	[1.4]	[1.7]	[2.2]
40MHz < BW ≤ 100MHz	[2.1]	[2.3]	[2.3]

Table 6.4B.2.2.3.4.2-2: Power Window (dB) for carrier leakage (step 4 and step 6)

	f ≤ 3GHz	3GHz < f ≤ 4.2GHz	4.2GHz < f ≤ 6GHz
BW ≤ 40MHz	[1.7]	[2.0]	[2.2]
40MHz < BW ≤ 100MHz	[2.1]	[2.3]	[2.5]

6.4B.2.2.3.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6.

6.4B.2.2.3.5 Test requirement

Each of the [20] In-band emissions results, derived in Annex E.4.3 shall not exceed the corresponding values in Tables 6.4B.2.2.3.5-1.

Table 6.4B.2.2.3.5-1: Minimum requirements for in-band emissions (allocated component carrier)

<table>
<tr><th>Parameter</th><th>Unit</th><th colspan="2">Limit</th><th>Applicable Frequencies</th></tr>
<tr><td>General</td><td>dB</td><td colspan="2">$\max\{-25-10\cdot\log_{10}(N_{RB}/L_{CRB}),$
$20\cdot\log_{10}EVM-3-5\cdot(\lvert\Delta_{RB}\rvert-1)/L_{CRB},$
$-57\,dBm/180\,kHz-P_{RB}\}$</td><td>Any non-allocated (NOTE 2)</td></tr>
<tr><td>IQ Image</td><td>dB</td><td colspan="2">-25</td><td>Exception for IQ image (NOTE 3)</td></tr>
<tr><td rowspan="3">Carrier leakage</td><td rowspan="3">dBc</td><td>-25</td><td>Output power > 0 dBm</td><td rowspan="3">Exception for Carrier frequency (NOTE 4)</td></tr>
<tr><td>-20</td><td>-30 dBm ≤ Output power ≤ 0 dBm</td></tr>
<tr><td>-10</td><td>-40 dBm ≤ Output power < -30 dBm</td></tr>
<tr><td colspan="5">NOTE 1: An in-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the minimum requirement is calculated as the higher of P_{RB} - 30 dB and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply. P_{RB} is defined in NOTE 9. The limit is evaluated in each non-allocated RB.
NOTE 2: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured average power per allocated RB, where the averaging is done across all allocated RBs.
NOTE 3: Exceptions to the general limit are allowed for up to L_{CRBs} +1 RBs within a contiguous width of L_{CRBs} +1 non-allocated RBs. The measurement bandwidth is 1 RB.
NOTE 4: Exceptions to the general limit are allowed for up to two contiguous non-allocated RBs. The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in the non-allocated RB to the measured total power in all allocated RBs.
NOTE 5: L_{CRB} is the Transmission Bandwidth (see Figure [5.6-1]) not exceeding $\lfloor N_{RB}/2-1\rfloor$
NOTE 6: N_{RB} is the Transmission Bandwidth Configuration (see Figure [5.6-1]) of the component carrier with RBs allocated.
NOTE 7: EVM is the limit specified in Table 6.4.2.1.3-1 for the modulation format used in the allocated RBs.
NOTE 8: Δ_{RB} is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g. $\Delta_{RB}=1$ or $\Delta_{RB}=-1$ for the first adjacent RB outside of the allocated bandwidth).
NOTE 9: P_{RB} is the transmitted power per 180 kHz in allocated RBs, measured in dBm.</td></tr>
</table>

Table 6.4B.2.2.3.5-2: Minimum requirements for in-band emissions (not allocated component carrier)

<table>
<tr><th>Para-meter</th><th>Unit</th><th>Meas BW NOTE 1</th><th colspan="2">Limit</th><th>remark</th><th>Applicable Frequencies</th></tr>
<tr><td>General</td><td>dB</td><td>BW of 1 RB (180KHz rectangular)</td><td colspan="2">$\max\{-25-10\cdot\log_{10}(N_{RB}/L_{CRB}),$
$20\cdot\log_{10} EVM -3-5\cdot(\lvert\Delta_{RB}\rvert-1)/L_{CRB},$
$-57\, dBm/180\, kHz - P_{RB}\}$</td><td>The reference value is the average power per allocated RB in the allocated component carrier</td><td>Any RB in the non allocated component carrier. The frequency raster of the RBs is derived when this component carrier is allocated with RBs</td></tr>
<tr><td>IQ Image</td><td>dB</td><td>BW of 1 RB (180KHz rectangular)</td><td colspan="2">-25
NOTE 2</td><td>The reference value is the average power per allocated RB in the allocated component carrier</td><td>The frequencies of the L_{CRB} contiguous non-allocated RBs are unknown. The frequency raster of the RBs is derived when this component carrier is allocated with RBs</td></tr>
<tr><td rowspan="4">Carrier leakage</td><td rowspan="4">dBc</td><td rowspan="4">BW of 1 RB (180KHz rectangular)</td><td colspan="2">NOTE 3</td><td rowspan="4">The reference value is the total power of the allocated RBs in the allocated component carrier</td><td rowspan="4">The frequencies of the up to 2 non-allocated RBs are unknown. The frequency raster of the RBs is derived when this component carrier is allocated with RBs</td></tr>
<tr><td>-25</td><td>Output power > 0 dBm</td></tr>
<tr><td>-20</td><td>-30 dBm ≤ Output power ≤ 0 dBm</td></tr>
<tr><td>-10</td><td>-40 dBm ≤ Output power < -30 dBm</td></tr>
<tr><td colspan="7">NOTE1: Resolution BWs smaller than the measurement BW may be integrated to achieve the measurement bandwidth.
NOTE 2: Exceptions to the general limit is are allowed for up to L_{CRB} +1 RBs within a contiguous width of L_{CRB} +1 non-allocated RBs.
NOTE 3: Two Exceptions to the general limit are allowed for up to two contiguous non-allocated RBs
NOTE 4: NOTES 1, 5, 6, 7, 8, 9 from Table 6.4B.2.2.3.5-1 apply for Table 6.4B.2.2.3.5-2 as well.
NOTE 5: Δ_{RB} for measured non-allocated RB in the non allocated component carrier may take non-integer values when the carrier spacing between the CCs is not a multiple of RB.</td></tr>
</table>

6.4B.2.3 Transmit Modulation Quality for inter-band EN-DC within FR1

6.4B.2.3.1 Error Vector Magnitude for inter-band EN-DC within FR1

6.4B.2.3.1.1 Test purpose

Same test purpose as in clause 6.4.2.1.1 in TS 38.521-1 [8] for the NR carrier.

6.4B.2.3.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC.

6.4B.2.3.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.4.2.1.3 in TS 38.521-1 [8] for the NR carrier.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.2.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.4B.2.3.1.4 Test description

Same test description as in clause 6.4.2.1.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1.For Initial conditions as in clause 6.4.2.1.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4.2.1.4.1 in TS 38.521-1 [8] is replaced by the following two steps:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.
7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Same test procedure as in clause 6.4.2.1.4.2 in TS 38.521-1 [8] and test procedures for PUCCH and PRACH are not applicable.

6.4B.2.3.1.5 Test requirement

Same test requirement as in clause 6.4.2.1.5 in TS 38.521-1 [8] for the NR carrier.

6.4B.2.3.2 Carrier Leakage for inter-band EN-DC within FR1

6.4B.2.3.2.1 Test purpose

Same test purpose as in clause 6.4.2.2.1 in TS 38.521-1 [8] for the NR carrier.

6.4B.2.3.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC.

6.4B.2.3.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.4.2.2.3 in TS 38.521-1 [8] for the NR carrier.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.2.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.4B.2.3.2.4 Test description

Same test description as in clause 6.4.2.2.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1.

For Initial conditions as in clause 6.4.2.2.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5.2.2.4.1 in TS 38.521-1 [8] is replaced by by the following two steps:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

6.4B.2.3.2.5 Test requirement

Same test requirement as in clause 6.4.2.2.5 in TS 38.521-1 [8] for the NR carrier.

6.4B.2.3.3 In-band Emissions for inter-band EN-DC within FR1

6.4B.2.3.3.1 Test purpose

Same test purpose as in clause 6.4.2.3.1 in TS 38.521-1 [8] for the NR carrier.

6.4B.2.3.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC.

6.4B.2.3.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.4.2.3.3 in TS 38.521-1 [8] for the NR carrier.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.4B.2.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.4B.2.3.3.4 Test description

Same test description as in clause 6.4.2.1.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1.For Initial conditions as in clause 6.4.2.1.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4.2.1.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Same test procedure as in clause 6.4.2.3.4.2 in TS 38.521-1 [8] and test procedures for PUSCH and PRACH are not applicable.

6.4B.2.3.3.5 Test requirement

Same test requirement as in clause 6.4.2.3.5 in TS 38.521-1 [8] for the NR carrier.

6.4B.2.4 Transmit Modulation Quality for inter-band EN-DC including FR2

6.4B.2.4.1 Error Vector Magnitude for inter-band EN-DC including FR2

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.4.2.1 in TS 38.521-2 is incomplete.
- Measurement Uncertainty and Test Tolerance are FFS.
- 38.101-2 Clause 6.3.4.3: Relative power tolerances are in square brackets.
- Annex on Global In-Channel TX-Test contains TBDs for PRACH.

6.4B.2.4.1.1 Test purpose

Same test purpose as in clause 6.4.2.1 in TS 38.521-2 [9] for the NR carrier.

6.4B.2.4.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2.

6.4B.2.4.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.4.2.1.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.4B.2.4.1.4 Test description

6.4B.2.4.1.4.1 Initial conditions

Same test description as in clause 6.4.2.1.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1. For Initial conditions as in clause 6.4.2.1.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4.2.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.4.2.1.4.1 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.4B.2.4.1.5 Test requirement

Same test requirement as in clause 6.4.2.1.5 in TS 38.521-2 [9] for the NR carrier.

6.4B.2.4.2 Carrier Leakage for inter-band EN-DC including FR2

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.4.2.2 in TS 38.521-2 is incomplete.
- Measurement Uncertainty and Test Tolerance are FFS.
- 38.101-2 Clause 6.3.4.3: Relative power tolerances are in square brackets.

6.4B.2.4.2.1 Test purpose

Same test purpose as in clause 6.4.2.2 in TS 38.521-2 [9] for the NR carrier.

6.4B.2.4.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2.

6.4B.2.4.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.4.2.2.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied

6.4B.2.4.2.4 Test description

6.4B.2.4.2.4.1 Initial conditions

Same test description as in clause 6.4.2.2.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1. For Initial conditions as in clause 6.4.2.2.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4.2.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.4.2.2.4.1 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.4B.2.4.2.5 Test requirement

Same test requirement as in clause 6.4.2.2.5 in TS 38.521-2 [9] for the NR carrier.

6.4B.2.4.3 In-band Emissions for inter-band EN-DC including FR2

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.4.2.3 in TS 38.521-2 is incomplete.
- Measurement Uncertainty and Test Tolerance are FFS.
- 38.101-2 Clause 6.3.4.3: Relative power tolerances are in square brackets.

6.4B.2.4.3.1 Test purpose

Same test purpose as in clause 6.4.2.3 in TS 38.521-2 [9] for the NR carrier.

6.4B.2.4.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2.

6.4B.2.4.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.4.2.3.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.4B.2.4.3.4 Test description

6.4B.2.4.3.4.1 Initial conditions

Same test description as in clause 6.4.2.3.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1. For Initial conditions as in clause 6.4.2.3.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4.2.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.4.2.3.4.1 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.4B.2.4.3.5 Test requirement

Same test requirement as in clause 6.4.2.3.5 in TS 38.521-2 [9] for the NR carrier.

6.4B.2.4.4 EVM Equalizer Flatnessfor inter-band EN-DC including FR2

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.4.2.4 in TS 38.521-2 is incomplete.
- Measurement Uncertainty and Test Tolerance are FFS.
- 38.101-2 Clause 6.3.4.3: Relative power tolerances are in square brackets.

6.4B.2.4.4.1 Test purpose

Same test purpose as in clause 6.4.2.4 in TS 38.521-2 [9] for the NR carrier.

6.4B.2.4.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2.

6.4B.2.4.4.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.4.2.4.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.4B.2.4.4.4 Test description

6.4B.2.4.4.4.1 Initial conditions

Same test description as in clause 6.4.2.4.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1. For Initial conditions as in clause 6.4.2.4.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.4.2.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.4.2.4.4.1 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.4B.2.4.4.5 Test requirement

Same test requirement as in clause 6.4.2.4.5 in TS 38.521-2 [9] for the NR carrier.

6.5 Output RF spectrum emissions

6.5A Output RF spectrum emissions for CA

6.5A.1 Occupied bandwidth for CA without EN-DC

FFS

6.5A.2 Out-of-band emissions for CA without EN-DC

FFS

6.5A.2.3 Adjacent channel leakage ratio for CA without EN-DC

NOTE: No test case details specified as there are no exception requirements applicable to NR FR1 or NR FR2 as per TS 38.101-3 [4], clause 6.5A.2. The SA requirement for ACLR applies and is tested in TS 38.521-1 [8] and TS 38.521-2 [9] for FR1 and FR2 respectively.

6.5A.3 Spurious emissions for CA without EN-DC

FFS

6.5B Output RF spectrum emissions for DC

6.5B.1 Occupied bandwidth for EN-DC

6.5B.1.1 Occupied bandwidth for Intra-Band Contiguous EN-DC

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- measurement uncertainty for ENBW > 100 MHz is FFS.

6.5B.1.1.1 Test purpose

To verify that the UE occupied bandwidth for intra-band contiguous EN-DC for all transmission bandwidth configurations supported by the UE are less than their specific limits.

6.5B.1.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC.

6.5B.1.1.3 Minimum conformance requirements

For intra-band contiguous EN-DC, the occupied bandwidth is a measure of the bandwidth containing the 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 EN-BW in sub-clause 5.3B.

The normative reference for this measurement is TS 38.101-3 [4] clause 6.5B.1.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

6.5B.1.1.4 Test description

6.5B.1.1.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC configuration specified in clause 5.3B.1.2 and are shown in table 6.5B.1.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 6.5B.1.1.4.1-1: Test configuration table

<table>
<tr><th colspan="6">Initial Conditions</th></tr>
<tr><td colspan="2">Test Environment
as specified in TS 38.508-1 [6] subclause 4.1</td><td colspan="4">NC</td></tr>
<tr><td colspan="2">Test Frequencies
as specified in TS 38.508-1 [6] subclause 4.3.1</td><td colspan="4">Mid range</td></tr>
<tr><td colspan="2">Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1</td><td colspan="4">All</td></tr>
<tr><td colspan="2">Test SCS for the NR cell as specified in TS 38.521-1 [8] Table 5.3.5-1</td><td colspan="4">Lowest SCS per Channel Bandwidth</td></tr>
<tr><th colspan="6">Test Parameters</th></tr>
<tr><th rowspan="3">Test ID</th><th rowspan="3">Downlink Configuration</th><th colspan="4">EN-DC Uplink Configuration</th></tr>
<tr><th colspan="2">E-UTRA Cell</th><th colspan="2">NR Cell</th></tr>
<tr><th>Modulation</th><th>RB allocation (NOTE 2)</th><th>Modulation</th><th>RB allocation (NOTE 1)</th></tr>
<tr><td>1</td><td>N/A for OBW testing.</td><td>QPSK</td><td>Outer_Full</td><td>CP-OFDM QPSK</td><td>Outer_Full</td></tr>
<tr><td colspan="6">NOTE 1: The specific configuration of each RB allocation is defined in Table 6.1-1 in TS 38.521-1 [8].
NOTE 2: Outer_Full defined as the transmission bandwidth configuration N_{RB} per channel bandwidth for the E-UTRA component as indicated in TS 36.521-1 [10] Table 5.4.2-1.</td></tr>
</table>

1. Connect the SS to the UE antenna connectors as shown in [6] TS 38.508-1 A.3.1.2.1 for SS diagram and A.3.2.1 for UE diagram.

2. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] subclause 4.4.3.

3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0 and TS 38.521-1 [8] Annex C.0 for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.

4. The UL Reference Measurement channels are TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.

5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.2B.1.1.4.3.

6.5B.1.1.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according to table 6.5B.1.1.4.1-1 on E-UTRA CC and NR CC respectively. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. Send continuously uplink power control "up" commands to the UE for NR and E-UTRA carrier until the UE transmits at its P_{UMAX} level; allow at least 200 ms from the first TPC command for the UE to reach P_{UMAX} level.
3. Measure the power spectrum distribution over all EN-DC component carriers in the EN-DC within two times or more range over the requirement for Occupied Bandwidth specification for intra-band contiguous EN-DC centring on the current carrier frequency in the EN-DC configuration. The characteristics of the filter shall be approximately Gaussian (typical spectrum analyser filter). Other methods to measure the power spectrum distribution are allowed. The measuring duration is at least 1ms over consecutive active uplink slots.
4. Calculate the total power within the range of all frequencies measured in step 3 and save this value as “Total power”.
5. Sum up the power upward from the lower boundary of the measured frequency range in step 3 and seek the limit frequency point by which this sum becomes 0.5% of “Total power” and save this point as “Lower Frequency”.
6. Sum up the power downward from the upper boundary of the measured frequency range in step 3 and seek the limit frequency point by which this sum becomes 0.5% of “Total power” and save this point as “Upper Frequency”.
7. Calculate the difference “Upper Frequency” – “Lower Frequency” = “Occupied Bandwidth” between the two limit frequencies obtained in step 5 and step 6.

6.5B.1.1.4.3 Message contents

Message contents are according to TS 38.508-1 [6] subclause 4.6.1.

6.5B.1.1.5 Test requirements

The measured Occupied Bandwidth shall not exceed values of aggregated channel bandwidth as defined in section 5.3B.1.2 for intra-band contiguous EN-DC.

6.5B.1.2 Occupied bandwidth for Intra-Band Non-Contiguous EN-DC

Editor’s note: This clause is incomplete. The following aspects are either missing or not yet determined:

- Wgap for intraband non-contiguous EN-DC is FFS in TS 38.508-1 due to dependencies with RAN4.

6.5B.1.2.1 Test purpose

Same test purpose as in clause 6.5.1.1 in TS 38.521-1 [8] for the NR carrier.

6.5B.1.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non contiguous EN-DC.

6.5B.1.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.1.3 in TS 38.521-1 [8] for the NR carrier.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.5B.1.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.5B.1.2.4 Test description

Same test description as in clause 6.5.1.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause 6.5.1.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5.1.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Same test procedure as in clause 6.5.1.4.2 in TS 38.521-1 [8].

6.5B.1.2.5 Test requirement

Same test requirement as in clause 6.5.1.5 in TS 38.521-1 [8] for the NR carrier.

6.5B.1.3 Occupied bandwidth for Inter-Band EN-DC within FR1

6.5B.1.3.1 Test purpose

Same test purpose as in clause 6.5.1.1 in TS 38.521-1 [8] for the NR carrier.

6.5B.1.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC.

6.5B.1.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.1.3 in TS 38.521-1 [8] for the NR carrier.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.5B.1.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.5B.1.3.4 Test description

Same test description as in clause 6.5.1.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause 6.5.1.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for the cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5.1.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

6.5B.1.3.5 Test requirement

Same test requirement as in clause 6.5.1.5 in TS 38.521-1 [8] for the NR carrier.

6.5B.1.4 Occupied bandwidth for Inter-Band EN-DC including FR2

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.5.1 in TS 38.521-2 is incomplete
- Measurement Uncertainty FFS.
- OBW core requirement and waveform defined in TS 38.101-2 is under discussion in RAN4.

6.5B.1.4.1 Test purpose

Same test purpose as in clause 6.5.1.1 in TS 38.521-2 [9] for the NR carrier.

6.5B.1.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2.

6.5B.1.4.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.1.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.5B.1.4.4 Test description

6.5B.1.4.4.1 Initial conditions

Same test description as in clause 6.5.1.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1. For Initial conditions as in clause 6.5.1.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5.1.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.5.1.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.5B.1.4.5 Test requirement

Same test requirement as in clause 6.5.1.5 in TS 38.521-2 [9] for the NR carrier.

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

6.5B.2.1 Out-of-band emissions for Intra-band contiguous EN-DC

6.5B.2.1.1 Spectrum emissions mask for intra-band contiguous EN-DC

6.5B.2.1.1.1 Test purpose

To verify that the power of any UE emissions shall not exceed specified level for the specified aggregated bandwidth for the EN-DC intra-band contiguous.

6.5B.2.1.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC.

6.5B.2.1.1.3 Minimum conformance requirements

The general spectrum emission for intra-band contiguous EN-DC is specified in Table 6.5B.2.1.1.3-1.

Table 6.5B.2.1.1.3-1: General spectrum emission mask for intra-band contiguous EN-DC

Δf_{OOB} (MHz)	Spectrum emission limit (dBm)	Measurement bandwidth
± 0 – 1	Max(Round(10*log(0.15/ENBW)),-24)	30 kHz
± 1 – 5	-10	1 MHz
± 5 – ENBW	-13	1 MHz
± ENBW – (ENBW+5)	-25	1 MHz
NOTE: ENBW refers to the aggregated channel bandwidth in MHz as defined in sub-clause 5.3B.		

The normative reference for this measurement is TS 38.101-3 [4] clause 6.5B.2.1.1.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

6.5B.2.1.1.4 Test description

6.5B.2.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC configuration specified in clause 5.3B.1.2 and are shown in table 6.5B.2.1.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 6.5B.2.1.1.4.1-1: Test configuration table

Initial Conditions								
Test Environment as specified in TS 38.508-1 [6] subclause 4.1					NC			
Test Frequencies as specified in TS 38.508-1 [6] subclause 4.3.1					Low range, High range			
Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1					Lowest N_{RB_agg}, Highest N_{RB_agg} (Note 2)			
Test SCS for the NR cell as specified in TS 38.521-1 [8] Table 5.3.5-1					Lowest, Highest			
Test Parameters								
Test ID	**Freq**	**ChBw**	**SCS**	**Downlink Configuration**	**EN-DC Uplink Configuration**			
					E-UTRA Cell		**NR Cell**	
					Modulation	**RB allocation (Note 5)**	**Modulation**	**RB allocation (NOTE 1)**
1	Default	Default	Default	N/A for SEM test case	16QAM	Outer_Full	DFT-s-OFDM PI/2 BPSK	Outer_Full
2 (Note 3)	Default				16QAM	Outer_1RB_Left	DFT-s-OFDM PI/2 BPSK	Edge_1RB_Right
3 (Note 3)	Low				16QAM	Outer_1RB_Left	DFT-s-OFDM PI/2 BPSK	N/A
4 (Note 3)	High				16QAM	N/A	DFT-s-OFDM PI/2 BPSK	Edge_1RB_Right
5 (Note 4)	Default				16QAM	Outer_1RB_Right	DFT-s-OFDM PI/2 BPSK	Edge_1RB_Left
6 (Note 4)	Low				16QAM	N/A	DFT-s-OFDM PI/2 BPSK	Edge_1RB_Left
7 (Note 4)	High				16QAM	Outer_1RB_Right	DFT-s-OFDM PI/2 BPSK	N/A
8	Default				16QAM	Outer_Full	DFT-s-OFDM QPSK	Outer_Full
9 (Note 3)	Default				16QAM	Outer_1RB_Left	DFT-s-OFDM QPSK	Edge_1RB_Right
10 (Note 3)	Low				16QAM	Outer_1RB_Left	DFT-s-OFDM QPSK	N/A
11 (Note 3)	High				16QAM	N/A	DFT-s-OFDM QPSK	Edge_1RB_Right
12 (Note 4)	Default				16QAM	Outer_1RB_Right	DFT-s-OFDM QPSK	Edge_1RB_Left
13 (Note 4)	Low				16QAM	N/A	DFT-s-OFDM QPSK	Edge_1RB_Left
14 (Note 4)	High				16QAM	Outer_1RB_Right	DFT-s-OFDM QPSK	N/A
15	Default				16QAM	Outer_Full	DFT-s-OFDM 16QAM	Outer_Full
16 (Note 3)	Default				16QAM	Outer_1RB_Left	DFT-s-OFDM 16QAM	Edge_1RB_Right
17 (Note 3)	Low				16QAM	Outer_1RB_Left	DFT-s-OFDM 16QAM	N/A
18 (Note 3)	High				16QAM	N/A	DFT-s-OFDM 16QAM	Edge_1RB_Right
19 (Note 4)	Default				16QAM	Outer_1RB_Right	DFT-s-OFDM 16QAM	Edge_1RB_Left
20 (Note 4)	Low				16QAM	N/A	DFT-s-OFDM 16QAM	Edge_1RB_Left
21 (Note 4)	High				16QAM	Outer_1RB_Right	DFT-s-OFDM 16QAM	N/A
22	Default				16QAM	Outer_Full	DFT-s-OFDM 64QAM	Outer_Full
23 (Note 3)	Low				16QAM	Outer_1RB_Left	DFT-s-OFDM 64QAM	Edge_1RB_Right
24 (Note 4)	High				16QAM	Outer_1RB_Right	DFT-s-OFDM 64QAM	Edge_1RB_Left
25	Default				16QAM	Outer_Full	DFT-s-OFDM 256QAM	Outer_Full

26 (Note 3)	Low				16QAM	Outer_1RB _Left	DFT-s-OFDM 256QAM	Edge_1RB_ Right
27 (Note 4)	High				16QAM	Outer_1RB _Right	DFT-s-OFDM 256QAM	Edge_1RB_ Left
28	Default				16QAM	Outer_Full	CP-OFDM PI/2 BPSK	Outer_Full
29 (Note 3)	Default				16QAM	Outer_1RB _Left	CP-OFDM PI/2 BPSK	Edge_1RB_ Right
30 (Note 3)	Low				16QAM	Outer_1RB _Left	CP-OFDM PI/2 BPSK	N/A
31 (Note 3)	High				16QAM	N/A	CP-OFDM PI/2 BPSK	Edge_1RB_ Right
32 (Note 4)	Default				16QAM	Outer_1RB _Right	CP-OFDM PI/2 BPSK	Edge_1RB_ Left
33 (Note 4)	Low				16QAM	N/A	CP-OFDM PI/2 BPSK	Edge_1RB_ Left
34 (Note 4)	High				16QAM	Outer_1RB _Right	CP-OFDM PI/2 BPSK	N/A
35	Default				16QAM	Outer_Full	CP-OFDM QPSK	Outer_Full
36 (Note 3)	Default				16QAM	Outer_1RB _Left	CP-OFDM QPSK	Edge_1RB_ Right
37 (Note 3)	Low				16QAM	Outer_1RB _Left	CP-OFDM QPSK	N/A
38 (Note 3)	High				16QAM	N/A	CP-OFDM QPSK	Edge_1RB_ Right
39 (Note 4)	Default				16QAM	Outer_1RB _Right	CP-OFDM QPSK	Edge_1RB_ Left
40 (Note 4)	Low				16QAM	N/A	CP-OFDM QPSK	Edge_1RB_ Left
41 (Note 4)	High				16QAM	Outer_1RB _Right	CP-OFDM QPSK	N/A
42	Default				16QAM	Outer_Full	CP-OFDM 16QAM	Outer_Full
43 (Note 3)	Default				16QAM	Outer_1RB _Left	CP-OFDM 16QAM	Edge_1RB_ Right
44 (Note 3)	Low				16QAM	Outer_1RB _Left	CP-OFDM 16QAM	N/A
45 (Note 3)	High				16QAM	N/A	CP-OFDM 16QAM	Edge_1RB_ Right
46 (Note 4)	Default				16QAM	Outer_1RB _Right	CP-OFDM 16QAM	Edge_1RB_ Left
47 (Note 4)	Low				16QAM	N/A	CP-OFDM 16QAM	Edge_1RB_ Left
48 (Note 4)	High				16QAM	Outer_1RB _Right	CP-OFDM 16QAM	N/A
49	Default				16QAM	Outer_Full	CP-OFDM 64QAM	Outer_Full
50 (Note 3)	Low				16QAM	Outer_1RB _Left	CP-OFDM 64QAM	Edge_1RB_ Right
51 (Note 4)	High				16QAM	Outer_1RB _Right	CP-OFDM 64QAM	Edge_1RB_ Left
52	Default				16QAM	Outer_Full	CP-OFDM 256QAM	Outer_Full
53 (Note 3)	Low				16QAM	Outer_1RB _Left	CP-OFDM 256QAM	Edge_1RB_ Right
54 (Note 4)	High				16QAM	Outer_1RB _Right	CP-OFDM 256QAM	Edge_1RB_ Left

NOTE 1: The specific configuration of each RB allocation is defined in Table 6.1-1 in TS 38.521-1 [8]. NOTE 2: If the UE supports multiple CC combinations in the EN-DC configuration with the same N_{RB_agg}, select the combination to test as follows: - Lowest ENBW: NR component with lowest N_{RB} is tested. - Highest ENBW: NR component with highest N_{RB} is tested. NOTE 3: Applicable when E-UTRA cell carrier frequency is lower than NR cell carrier. NOTE 4: Applicable when NR cell carrier frequency is lower than E-UTRA cell carrier. NOTE 5: Outer_Full defined as the transmission bandwidth configuration N_{RB} per channel bandwidth for the E-UTRA component as indicated in TS 36.521 [10] Table 5.4.2-1. Outer_1RB_Left defined as 1 RB allocated at the left edge of the E-UTRA component. Outer_1RB_Right defined as 1 RB allocated at the right edge of the E-UTRA component. NOTE 2: DFT-s-OFDM PI/2 BPSK test applies only for UEs which supports half Pi BPSK in FR1

1. Connect the SS to the UE antenna connectors as shown in [6] TS 38.508-1 A.3.1.2.1 for SS diagram and A.3.2.1 for UE diagram.
2. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] subclause 4.4.3.
3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0 and TS 38.521-1 [8] Annex C.0 for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.
4. The UL Reference Measurement channels are TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.
5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.
6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.2B.1.1.4.3.

6.5B.2.1.1.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according to table 6.5B.1.1.4.1-1 on E-UTRA CC and NR CC respectively. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. Send continuously uplink power control "up" commands to the UE for NR and E-UTRA carrier until the UE transmits at its P_{UMAX} level; allow at least 200 ms from the first TPC command for the UE to reach P_{UMAX} level.
3. Measure the mean power over all component carriers for the EN-DC configuration. The period of measurement shall be at least the continuous duration of 1ms over consecutive active uplink slotsFor TDD, only slots consisting of only UL symbols are under test. .
4. Measure the power of the transmitted signal with a measurement filter of bandwidths according to table 6.5B.2.1.1.5-1. The centre frequency of the filter shall be stepped in continuous steps according to the same table. The measured power shall be recorded for each step. The measurement period shall capture the active TSs.

NOTE 1: When switching to DFT-s-OFDM waveform, as specified in the test configuration table 6.5B.2.1.1.4.1-1, send an NR RRCReconfiguration message according to TS 38.508-1 [6] clause 4.6.3 Table 4.6.3-118 PUSCH-Config with TRANSFORM_PRECODER_ENABLED condition.

6.5B.2.1.2.4.3 Message contents

Message contents are according to TS 38.508-1 [6] subclause 4.6.1.

6.5B.2.1.2.5 Test requirements

The power of any UE emissions shall fulfil requirements in Table 6.5B.2.1.2.5-1.

Table 6.5B.2.1.1.5-1: General spectrum emission mask for intra-band contiguous EN-DC

Δf_{OOB} (MHz)	Spectrum emission limit (dBm)	Measurement bandwidth
± 0 - 1	Max(Round(10*log(0.15/ENBW)),-24)	30 kHz
± 1 - 5	-10 + TT	1 MHz
± 5 - ENBW	-13 + TT	1 MHz
± ENBW – (ENBW+5)	-25 + TT	1 MHz
NOTE: ENBW refers to the aggregated channel bandwidth in MHz as defined in sub-clause 5.3B.		

Table 6.5B.2.1.1.5-2: Test Tolerance (Spectrum Emission Mask)

f ≤ 3.0GHz	3.0GHz < f ≤ 4.2GHz	4.2GHz < f ≤ 6.0GHz
1.5 dB	1.8 dB	1.8 dB

6.5B.2.1.2 Additional spectrum emissions mask for intra-band contiguous EN-DC

Editor's note: The following aspects are either missing or not yet determined:

- Testing with dynamic and static power sharing is incomplete.

6.5B.2.1.2.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to other channels or other systems in terms of transmitter spurious emissions under the deployment scenarios where additional requirements are specified.

6.5B.2.1.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC.

6.5B.2.1.2.3 Minimum conformance requirements

6.5B.2.1.2.3.1 Minimum requirement for network signalled value "NS_35"

For contiguous intra-band EN-DC configuration of DC_(n)71AA when NS_35 is indicated for the UE the requirements in table 6.5B.2.1.2.3-1 apply in the frequency ranges immediately adjacent and outside the aggregation of the said sub-blocks

When NS_35 is indicated in the MCG and NS_35 is indicated in the SCG the requirements in table 6.5B.2.1.2.3.1-1 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.2.1.2.3.1-1: Additional requirements

	Frequency offset of measurement filter centre frequency, f_offset	Minimum requirement (dBm)	Measurement bandwidth
0 MHz ≤ Δf < 0.1 MHz	0.015 MHz ≤ f_offset < 0.085 MHz	-13	30 kHz
0.1 MHz ≤ Δf < ENBW	0.15 MHz ≤ f_offset < ENBW-0.05 MHz	-13	100 kHz
ENBW ≤ Δf < ENBW +5 MHz	ENBW + 0.5 MHz ≤ f_offset < ENBW + 4.5 MHz	-25	1 MHz
NOTE: 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.			

The normative reference for this requirement is TS 38.101-3 [4] clause 6.5B.2.1.2.1.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

6.5B.2.1.2.3.2 Minimum requirement 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 LTE carriers is document in 36.101 [5], and the emission bandwidth for NR carriers is documented in 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.2.1.2.3.2-1.

Table 6.5B.2.1.2.3.2-1: n41 SEM with NS_04

	Spectrum emission limit (dBm)/ measurement bandwidth for each channel bandwidth						
ΔfOOB MHz	**10 MHz**	**15 MHz**	**20 MHz**	**40 MHz**	**50 MHz**	**> 50 MHz**	**Measurement bandwidth**
± 0 - 1	-18	-20	-21	-24	-25		30 kHz
± 1 - 5	-10						1 MHz
± 5 - X	-13						
± X - (BWChannel + 5 MHz)	-25						
NOTE 1: X is defined as the sum of the emission bandwidth of the component carriers plus the guard band between contiguous CCs.							

The normative reference for this requirement is TS 38.101-3 [4] clause 6.5B.2.1.2.2

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

6.5B.2.1.2.4 Test description

6.5B.2.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All these configurations shall be tested with applicable test parameters for each EN-DC configuration specified in clause 5.3B.1.2 and are shown in table 6.5B.2.1.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 6.5B.2.1.2.4.1-0: E-UTRA test configuration table

E-UTRA Test Parameters				
E-UTRA Channel Bandwidth	**E-UTRA Test Frequency (Note 1)**	**Downlink**	**Uplink**	
			Modulation	**RB allocation**
20 MHz	Low range and High range (Note 2)	N/A for A-MPR testing.	QPSK	100
NOTE 1: E-UTRA Test Frequency as specified in TS 36.508 [6] subclause 4.3.1 NOTE 2: NR carrier shall be the outermost carrier during test.				

Table 6.5B.2.1.2.4.1-1: Test configuration table for NS_35

Initial Conditions								
Test Environment as specified in TS 38.508-1 [6] subclause 4.1					Normal			
Test Frequencies as specified in TS 38.508-1 [6] subclause 4.3.1					Low range and High range (Note 1)			
Test CC Combinations setting (N_{RB_agg}) as specified in TS 38.508-1 [6] subclause 4.3.1					Lowest N_{RB_agg}, Highest N_{RB_agg} (Note 2)			
Test SCS as specified in Table 5.3.5-1					Lowest and Highest			
A-MPR test parameters for "NS_35"								
Test ID	**Freq**	**ChBw**	**SCS**	**Downlink Configuration**	**EN-DC Uplink Configuration**			
					E-UTRA Cell		**NR Cell**	
					Modulation	**RB allocation**	**Modulation**	**NR RB allocation**
1	Low	Default	Default	N/A for A-MPR testing.	16 QAM	Outer_Full	DFT-s-OFDM 64 QAM	Edge_1RB_Left
2	High				16 QAM	Outer_Full	DFT-s-OFDM 64 QAM	Edge_1RB_Left
3	Low				16 QAM	Outer_Full	DFT-s-OFDM 64 QAM	Edge_1RB_Right
4	Low				16 QAM	Outer_Full	DFT-s-OFDM 64 QAM	Edge_1RB_Right
5	High				16 QAM	Outer_Full	DFT-s-OFDM 64 QAM	Outer_Full
6	High				16 QAM	Outer_Full	DFT-s-OFDM 64 QAM	Outer_Full
5	High				16 QAM	Outer_Full	DFT-s-OFDM 64 QAM	Outer_Full
6	High				16 QAM	Outer_Full	DFT-s-OFDM 64 QAM	Outer_Full
NOTE 1: NR carrier shall be the outermost carrier during test. NOTE 2: If the UE supports multiple CC combinations in the EN-DC configuration with the same NRB_agg, select the combination to test as follows: Lowest ENBW: NR component with lowest NRB is tested. Highest ENBW: NR component with highest NRB is tested.								

Table 6.5B.2.1.2.4.1-2: NR test configuration table for NS_04

Initial Conditions								
Test Environment as specified in TS 38.508-1 [6] subclause 4.1					NC			
Test Frequencies as specified in TS 38.508-1 [6] subclause 4.3.1					Low range, High range			
Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1					Lowest N_{RB_agg}, Highest N_{RB_agg} (Note 2)			
Test SCS for the NR cell as specified in TS 38.521-1 [8] Table 5.3.5-1					Lowest, Highest			
Test Parameters								
Test ID	**Freq**	**ChBw**	**SCS**	**Downlink Configuration**	**EN-DC Uplink Configuration**			
					E-UTRA Cell		**NR Cell**	
					Modulation	**RB allocation (Note 5)**	**Modulation**	**RB allocation (NOTE 1)**
1	Default	Default	Default	N/A for A-MPR test case	16QAM	Outer_Full	DFT-s-OFDM PI/2 BPSK	Outer_Full
2 (Note 3)	Default				16QAM	Outer_1RB_Left	DFT-s-OFDM PI/2 BPSK	Edge_1RB_Right
3 (Note 3)	Low				16QAM	Outer_1RB_Left	DFT-s-OFDM PI/2 BPSK	N/A
4 (Note 3)	High				16QAM	N/A	DFT-s-OFDM PI/2 BPSK	Edge_1RB_Right
5 (Note 4)	Default				16QAM	Outer_1RB_Right	DFT-s-OFDM PI/2 BPSK	Edge_1RB_Left
6 (Note 4)	Low				16QAM	N/A	DFT-s-OFDM PI/2 BPSK	Edge_1RB_Left
7 (Note 4)	High				16QAM	Outer_1RB_Right	DFT-s-OFDM PI/2 BPSK	N/A
8	Default				16QAM	Outer_Full	DFT-s-OFDM QPSK	Outer_Full
9 (Note 3)	Default				16QAM	Outer_1RB_Left	DFT-s-OFDM QPSK	Edge_1RB_Right
10 (Note 3)	Low				16QAM	Outer_1RB_Left	DFT-s-OFDM QPSK	N/A
11 (Note 3)	High				16QAM	N/A	DFT-s-OFDM QPSK	Edge_1RB_Right
12 (Note 4)	Default				16QAM	Outer_1RB_Right	DFT-s-OFDM QPSK	Edge_1RB_Left
13 (Note 4)	Low				16QAM	N/A	DFT-s-OFDM QPSK	Edge_1RB_Left
14 (Note 4)	High				16QAM	Outer_1RB_Right	DFT-s-OFDM QPSK	N/A
15	Default				16QAM	Outer_Full	DFT-s-OFDM 16QAM	Outer_Full
16 (Note 3)	Default				16QAM	Outer_1RB_Left	DFT-s-OFDM 16QAM	Edge_1RB_Right
17 (Note 3)	Low				16QAM	Outer_1RB_Left	DFT-s-OFDM 16QAM	N/A
18 (Note 3)	High				16QAM	N/A	DFT-s-OFDM 16QAM	Edge_1RB_Right
19 (Note 4)	Default				16QAM	Outer_1RB_Right	DFT-s-OFDM 16QAM	Edge_1RB_Left
20 (Note 4)	Low				16QAM	N/A	DFT-s-OFDM 16QAM	Edge_1RB_Left
21 (Note 4)	High				16QAM	Outer_1RB_Right	DFT-s-OFDM 16QAM	N/A
22	Default				16QAM	Outer_Full	DFT-s-OFDM 64QAM	Outer_Full
23 (Note 3)	Low				16QAM	Outer_1RB_Left	DFT-s-OFDM 64QAM	Edge_1RB_Right
24 (Note 4)	High				16QAM	Outer_1RB_Right	DFT-s-OFDM 64QAM	Edge_1RB_Left

25	Default				16QAM	Outer_Full	DFT-s-OFDM 256QAM	Outer_Full
26 (Note 3)	Low				16QAM	Outer_1RB_Left	DFT-s-OFDM 256QAM	Edge_1RB_Right
27 (Note 4)	High				16QAM	Outer_1RB_Right	DFT-s-OFDM 256QAM	Edge_1RB_Left
28	Default				16QAM	Outer_Full	CP-OFDM QPSK	Outer_Full
29 (Note 3)	Default				16QAM	Outer_1RB_Left	CP-OFDM QPSK	Edge_1RB_Right
30 (Note 3)	Low				16QAM	Outer_1RB_Left	CP-OFDM QPSK	N/A
31 (Note 3)	High				16QAM	N/A	CP-OFDM QPSK	Edge_1RB_Right
32 (Note 4)	Default				16QAM	Outer_1RB_Right	CP-OFDM QPSK	Edge_1RB_Left
33 (Note 4)	Low				16QAM	N/A	CP-OFDM QPSK	Edge_1RB_Left
34 (Note 4)	High				16QAM	Outer_1RB_Right	CP-OFDM QPSK	N/A
35	Default				16QAM	Outer_Full	CP-OFDM 16QAM	Outer_Full
36 (Note 3)	Default				16QAM	Outer_1RB_Left	CP-OFDM 16QAM	Edge_1RB_Right
37 (Note 3)	Low				16QAM	Outer_1RB_Left	CP-OFDM 16QAM	N/A
38 (Note 3)	High				16QAM	N/A	CP-OFDM 16QAM	Edge_1RB_Right
39 (Note 4)	Default				16QAM	Outer_1RB_Right	CP-OFDM 16QAM	Edge_1RB_Left
47 (Note 4)	Low				16QAM	N/A	CP-OFDM 16QAM	Edge_1RB_Left
41 (Note 4)	High				16QAM	Outer_1RB_Right	CP-OFDM 16QAM	N/A
42	Default				16QAM	Outer_Full	CP-OFDM 64QAM	Outer_Full
43 (Note 3)	Low				16QAM	Outer_1RB_Left	CP-OFDM 64QAM	Edge_1RB_Right
44 (Note 4)	High				16QAM	Outer_1RB_Right	CP-OFDM 64QAM	Edge_1RB_Left
45	Default				16QAM	Outer_Full	CP-OFDM 256QAM	Outer_Full
46 (Note 3)	Low				16QAM	Outer_1RB_Left	CP-OFDM 256QAM	Edge_1RB_Right
47 (Note 4)	High				16QAM	Outer_1RB_Right	CP-OFDM 256QAM	Edge_1RB_Left

NOTE 1: The specific configuration of each RB allocation is defined in Table 6.1-1 in TS 38.521-1 [8].
NOTE 2: If the UE supports multiple CC combinations in the EN-DC configuration with the same N_{RB_agg}, select the combination to test as follows:
- Lowest ENBW: NR component with lowest N_{RB} is tested.
- Highest ENBW: NR component with highest N_{RB} is tested.

NOTE 3: Applicable when E-UTRA cell carrier frequency is lower than NR cell carrier.
NOTE 4: Applicable when NR cell carrier frequency is lower than E-UTRA cell carrier.
NOTE 5: Outer_Full defined as the transmission bandwidth configuration N_{RB} per channel bandwidth for the E-UTRA component as indicated in TS 36.521 [10] Table 5.4.2-1. Outer_1RB_Left defined as 1 RB allocated at the left edge of the E-UTRA component. Outer_1RB_Right defined as 1 RB allocated at the right edge of the E-UTRA component.
NOTE 6: DFT-s-OFDM PI/2 BPSK test applies only for UEs which supports half Pi BPSK in FR1

Editor's note: The following lines belong at the end of section 6.5B.2.1.2.4.1. As new tables are added to this section, these lines should always follow the tables.

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [6] Annex A, Figure A.3.1.2.1 for SS diagram and section A.3.2.1 for UE diagram.

2. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] subclause 4.4.3.
3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0 and TS 38.521-1 [8] Annex C.0 for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.
4. The UL Reference Measurement channels are set according to TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG link and NR CG link respectively.
5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG link and NR CG link respectively.
6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG* , Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.5B.2.1.2.4.3.

6.5B.2.1.2.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format [0_1] for C_RNTI to schedule the UL RMC according to table 6.2B.3.1.4.1-1 on both EN-DC component carriers. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.
2. Send continuously uplink power control "up" commands to the UE for NR and E-UTRA carrier until the UE transmits at its P_{UMAX} level; allow at least 200 ms from the first TPC command starting from the first TPC command in this step for the UE to reach P_{UMAX} level.
3. Measure the mean power over all component carriers for the EN-DC configuration, which shall meet the requirements described in table 6.5B.2.1.2.5.1-1 thru 6.5B.2.1.2.5.2-1. The period of the measurement shall be at least the continuous duration of one active sub-frame (1ms). For TDD slots with transient periods are not under test.
4. Measure the power of the transmitted signal with a measurement filter of bandwidths according to table 6.5B.2.1.2.5-1. The centre frequency of the filter shall be stepped in contiguous steps according to the same table. The measured power shall be recorded for each step. The measurement period shall capture the active time slots.

NOTE 1: When switching to DFT-s-OFDM waveform, as specified in the test configuration table 6.5B.2.1.2.4.1-1 and 6.5B.2.1.2.4.1-2, send an RRCConnectionReconfiguration message containing NR RRCReconfiguration message according to TS 38.508-1 [6] clause 4.6.3 Table 4.6.3-118 PUSCH-Config without CP-OFDM condition. When switching to CP-OFDM waveform, send an RRCConnectionReconfiguration message containing NR RRCReconfiguration message with CP-OFDM condition.

6.5B.2.1.2.4.3 Message contents

Message contents are according to TS 38.508-1 [6] subclause 4.6.1, with the following exceptions for each network signalled value.

Editor’s note: Exceptions to network signal values should be added as sub-clauses below.

6.5B.2.1.2.4.3.1 Message contents exceptions for network signalled value "NS_35"

For "NS_35" see A-MPR test case in table 6.2B.3.1.4.3.2-1.

6.5B.2.1.2.4.3.2 Message contents exceptions for network signalled value "NS_04"

For "NS_35" see A-MPR test case in table 6.2B.3.1.4.3.1-1.

6.5B.2.1.2.5 Test requirement

6.5B.2.1.2.5.1 Test requirement for network signalled value “NS_35”

When “NS_35” is indicated in the cell measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in table 6.2B.3.1.5.1-1, and the power of any UE shall not exceed the described values in table

6.5B.2.1.2.5.1-1. The requirements in the table apply in the frequency ranges immediately adjacent and outside the aggregation of the sub-blocks.

Table 6.5B.2.1.2.5.1-1: Additional requirements for “NS_35”

Δf_{OOB}	Frequency offset of measurement filter centre frequency, f_offset	Minimum requirement [dBm]	Measurement bandwidth
0 MHz ≤ Δf < 0.1 MHz	0.015 MHz ≤ f_offset < 0.085 MHz	-11.5	30 kHz
0.1 MHz ≤ Δf < ENBW	0.15 MHz ≤ f_offset < ENBW – 0.05 MHz	-11.5	100 kHz
ENBW ≤ Δf < ENBW +5 MHz	ENBW + 0.5 MHz ≤ f_offset < ENBW + 4.5 MHz	-23.5	1 MHz
NOTE: 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.2.1.2.5.2 Test requirement for network signalled value “NS_04”

When “NS_04” is indicated in the cell measured UE mean power in the channel bandwidth, derived in step 3, shall fulfil requirements in tables 6.2B.3.1.5.2-1, and the power of any UE shall not exceed the described values in table 6.5B.2.1.2.5.2-1. The requirements in the table apply in the frequency ranges immediately adjacent and outside the aggregation of the sub-blocks.

Table 6.5B.2.1.2.5.2-1: Additional requirements for n41 SEM with NS_04

	Spectrum emission limit (dBm)/ measurement bandwidth for each channel bandwidth						
Δf_{OOB} MHz	10 MHz	15 MHz	20 MHz	40 MHz	50 MHz	> 50 MHz	Measurement bandwidth
± 0 - 1	-16.5	-18.5	-19.5	-22.5	-23.5		30 kHz
± 1 - 5	-8.5						1 MHz
± 5 - X	-11.5						
± X - (BWChannel + 5 MHz)	-23.5						
NOTE 1: 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 intra-band contiguous EN-DC

Editor's note: Future optimization of this test case might be possible by combining ACLR measurement with MPR measurement

6.5B.2.1.3.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to adjacent channels in terms of Adjacent Channel Leakage Power Ratio (ACLR).

6.5B.2.1.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band EN-DC.

6.5B.2.1.3.3 Minimum conformance requirements

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 $EN\text{-}DC_{ACLR}$ 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$_{ACLR}$	dBc	30
Measurement bandwidth of EN-DC channel		1.00*ENBW
Measurement bandwidth of adjacent channel		0.95*ENBW
Frequency offset of adjacent channel		ENBW / -ENBW
NOTE 1: ENBW is the aggregated bandwidth in MHz as defined in sub-clause 5.3B. NOTE 2: The frequency offset is that in between the centre frequencies of the measurement filters		

The normative reference for this requirement is TS 38.101-3 [4] clause 6.5B.2.1.3.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

6.5B.2.1.3.4 Test description

6.5B.2.1.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC configuration specified in clause 5.3B.1.2 and are shown in table 6.5B.2.1.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 6.5B.2.1.3.4.1-1: Test Configuration Table

Initial Conditions								
Test Environment as specified in TS 38.508-1 [6] subclause 4.1					NC, TL/VL, TL/VH, TH/VL, TH/VH			
Test Frequencies as specified in TS 38.508-1 [6] subclause 4.3.1					Low range, High range			
Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1					Lowest N_{RB_agg}, Highest N_{RB_agg} (Note 2)			
Test SCS for the NR cell as specified in TS 38.521-1 [8] Table 5.3.5-1					Lowest, Highest			
Test Parameters								
Test ID	**Freq**	**ChBw**	**SCS**	**Downlink Configuration**	**EN-DC Uplink Configuration**			
					E-UTRA Cell		**NR Cell**	
					Modulation	**RB allocation (Note 5)**	**Modulation**	**RB allocation (NOTE 1)**
1	Default	Default	Default	N/A for ACLR test case	16QAM	Outer_Full	DFT-s-OFDM PI/2 BPSK	Outer_Full
2 (Note 3)	Default				16QAM	Outer_1RB_Left	DFT-s-OFDM PI/2 BPSK	Edge_1RB_Right
3 (Note 3)	Low				16QAM	Outer_1RB_Left	DFT-s-OFDM PI/2 BPSK	N/A
4 (Note 3)	High				16QAM	N/A	DFT-s-OFDM PI/2 BPSK	Edge_1RB_Right
5 (Note 4)	Default				16QAM	Outer_1RB_Right	DFT-s-OFDM PI/2 BPSK	Edge_1RB_Left
6 (Note 4)	Low				16QAM	N/A	DFT-s-OFDM PI/2 BPSK	Edge_1RB_Left
7 (Note 4)	High				16QAM	Outer_1RB_Right	DFT-s-OFDM PI/2 BPSK	N/A
8	Default				16QAM	Outer_Full	DFT-s-OFDM QPSK	Outer_Full
9 (Note 3)	Default				16QAM	Outer_1RB_Left	DFT-s-OFDM QPSK	Edge_1RB_Right
10 (Note 3)	Low				16QAM	Outer_1RB_Left	DFT-s-OFDM QPSK	N/A
11 (Note 3)	High				16QAM	N/A	DFT-s-OFDM QPSK	Edge_1RB_Right
12 (Note 4)	Default				16QAM	Outer_1RB_Right	DFT-s-OFDM QPSK	Edge_1RB_Left
13 (Note 4)	Low				16QAM	N/A	DFT-s-OFDM QPSK	Edge_1RB_Left
14 (Note 4)	High				16QAM	Outer_1RB_Right	DFT-s-OFDM QPSK	N/A
15	Default				16QAM	Outer_Full	DFT-s-OFDM 16QAM	Outer_Full
16 (Note 3)	Default				16QAM	Outer_1RB_Left	DFT-s-OFDM 16QAM	Edge_1RB_Right
17 (Note 3)	Low				16QAM	Outer_1RB_Left	DFT-s-OFDM 16QAM	N/A

18 (Note 3)	High				16QAM	N/A	DFT-s-OFDM 16QAM	Edge_1RB_Right
19 (Note 4)	Default				16QAM	Outer_1RB_Right	DFT-s-OFDM 16QAM	Edge_1RB_Left
20 (Note 4)	Low				16QAM	N/A	DFT-s-OFDM 16QAM	Edge_1RB_Left
21 (Note 4)	High				16QAM	Outer_1RB_Right	DFT-s-OFDM 16QAM	N/A
22	Default				16QAM	Outer_Full	DFT-s-OFDM 64QAM	Outer_Full
23 (Note 3)	Low				16QAM	Outer_1RB_Left	DFT-s-OFDM 64QAM	Edge_1RB_Right
24 (Note 4)	High				16QAM	Outer_1RB_Right	DFT-s-OFDM 64QAM	Edge_1RB_Left
25	Default				16QAM	Outer_Full	DFT-s-OFDM 256QAM	Outer_Full
26 (Note 3)	Low				16QAM	Outer_1RB_Left	DFT-s-OFDM 256QAM	Edge_1RB_Right
27 (Note 4)	High				16QAM	Outer_1RB_Right	DFT-s-OFDM 256QAM	Edge_1RB_Left
28	Default				16QAM	Outer_Full	CP-OFDM PI/2 BPSK	Outer_Full
29 (Note 3)	Default				16QAM	Outer_1RB_Left	CP-OFDM PI/2 BPSK	Edge_1RB_Right
30 (Note 3)	Low				16QAM	Outer_1RB_Left	CP-OFDM PI/2 BPSK	N/A
31 (Note 3)	High				16QAM	N/A	CP-OFDM PI/2 BPSK	Edge_1RB_Right
32 (Note 4)	Default				16QAM	Outer_1RB_Right	CP-OFDM PI/2 BPSK	Edge_1RB_Left
33 (Note 4)	Low				16QAM	N/A	CP-OFDM PI/2 BPSK	Edge_1RB_Left
34 (Note 4)	High				16QAM	Outer_1RB_Right	CP-OFDM PI/2 BPSK	N/A
35	Default				16QAM	Outer_Full	CP-OFDM QPSK	Outer_Full
36 (Note 3)	Default				16QAM	Outer_1RB_Left	CP-OFDM QPSK	Edge_1RB_Right
37 (Note 3)	Low				16QAM	Outer_1RB_Left	CP-OFDM QPSK	N/A
38 (Note 3)	High				16QAM	N/A	CP-OFDM QPSK	Edge_1RB_Right
39 (Note 4)	Default				16QAM	Outer_1RB_Right	CP-OFDM QPSK	Edge_1RB_Left
40 (Note 4)	Low				16QAM	N/A	CP-OFDM QPSK	Edge_1RB_Left

41 (Note 4)	High				16QAM	Outer_1RB_Right	CP-OFDM QPSK	N/A
42	Default				16QAM	Outer_Full	CP-OFDM 16QAM	Outer_Full
43 (Note 3)	Default				16QAM	Outer_1RB_Left	CP-OFDM 16QAM	Edge_1RB_Right
44 (Note 3)	Low				16QAM	Outer_1RB_Left	CP-OFDM 16QAM	N/A
45 (Note 3)	High				16QAM	N/A	CP-OFDM 16QAM	Edge_1RB_Right
46 (Note 4)	Default				16QAM	Outer_1RB_Right	CP-OFDM 16QAM	Edge_1RB_Left
47 (Note 4)	Low				16QAM	N/A	CP-OFDM 16QAM	Edge_1RB_Left
48 (Note 4)	High				16QAM	Outer_1RB_Right	CP-OFDM 16QAM	N/A
49	Default				16QAM	Outer_Full	CP-OFDM 64QAM	Outer_Full
50 (Note 3)	Low				16QAM	Outer_1RB_Left	CP-OFDM 64QAM	Edge_1RB_Right
51 (Note 4)	High				16QAM	Outer_1RB_Right	CP-OFDM 64QAM	Edge_1RB_Left
52	Default				16QAM	Outer_Full	CP-OFDM 256QAM	Outer_Full
53 (Note 3)	Low				16QAM	Outer_1RB_Left	CP-OFDM 256QAM	Edge_1RB_Right
54 (Note 4)	High				16QAM	Outer_1RB_Right	CP-OFDM 256QAM	Edge_1RB_Left

NOTE 1: The specific configuration of each RB allocation is defined in Table 6.1-1 in TS 38.521-1 [8].

NOTE 2: If the UE supports multiple CC combinations in the EN-DC configuration with the same N_{RB_agg}, select the combination to test as follows:

- Lowest ENBW: NR component with lowest N_{RB} is tested.
- Highest ENBW: NR component with highest N_{RB} is tested.

NOTE 3: Applicable when E-UTRA cell carrier frequency is lower than NR cell carrier.

NOTE 4: Applicable when NR cell carrier frequency is lower than E-UTRA cell carrier.

NOTE 5: Outer_Full defined as the transmission bandwidth configuration N_{RB} per channel bandwidth for the E-UTRA component as indicated in TS 36.521 [10] Table 5.4.2-1. Outer_1RB_Left defined as 1 RB allocated at the left edge of the E-UTRA component. Outer_1RB_Right defined as 1 RB allocated at the right edge of the E-UTRA component.

NOTE 6: DFT-s-OFDM PI/2 BPSK test applies only for UEs which supports half Pi BPSK in FR1

1. Connect the SS to the UE antenna connectors as shown in [6] TS 38.508-1 A.3.1.2.1 for SS diagram and A.3.2.1 for UE diagram.

2. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] subclause 4.4.3.

3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0 and TS 38.521-1 [8] Annex C.0 for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.

4. The UL Reference Measurement channels are TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.

5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG,* Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.2B.1.1.4.3.

6.5B.2.1.3.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format [0_1] for C_RNTI to schedule the UL RMC according to Table 6.5B.2.1.3.4.1-1 on both EN-DC component carriers. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

2. Send continuously uplink power control "up" commands to the UE for NR and E-UTRA carrier until the UE transmits at its P_{UMAX} level; allow at least 200ms for the UE to reach P_{UMAX} level.

3. Measure the filtered mean power of the transmitted signal centered on the aggregated sub-block ENBW with a measurement filter of bandwidth according to Table 6.5B.2.1.3-1. The period of the measurement shall be at least the continuous duration of 1ms over consecutive active uplink slots For TDD, only slots consisting of only UL symbols are under test. .

4. Measure the filtered mean power of the first adjacent channel on both lower and upper side of the assigned NR + E-UTRA channel, respectively with a frequency offset and measurement filter of bandwidth according to Table 6.5B.2.1.3-1.

5. Calculate the ratios of the power between the values measured in step 5 over step 6 for lower and upper side respectively.

NOTE 1: When switching to DFT-s-OFDM waveform, as specified in the test configuration table 6.5B.2.1.1.4.1-1, send an NR RRCReconfiguration message according to TS 38.508-1 [6] clause 4.6.3 Table 4.6.3-118 PUSCH-Config with TRANSFORM_PRECODER_ENABLED condition.

6.5B.2.1.3.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6.1.

6.5B.2.1.3.5 Test requirement

The measured adjacent channel power ratio, derived in step 5, shall be less than or equal to 30 + TT dBc , where

- TT = 0.8 dB for f ≤ 4.0GHz, TT = 1.0 dB for 4.0GHz < f ≤ 6.0GHz,

6.5B.2.2 Out-of-band emissions for Intra-band non-contiguous EN-DC

FFS.

6.5B.2.3 Out-of-band emissions for Inter-band EN-DC within FR1

6.5B.2.3.1 Spectrum emissions mask for Inter-band EN-DC within FR1

6.5B.2.3.1.1 Test purpose

Same test purpose as in clause 6.5.2.2 in TS 38.521-1 [8] for the NR carrier.

6.5B.2.3.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC.

6.5B.2.3.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.2.2.3 in TS 38.521-1 [8] for the NR carrier.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.5B.2.3.

6.5B.2.3.1.4 Test description

Same test description as in clause 6.5.2.2.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1.For Initial conditions as in clause 6.5.2.2.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS36.521-1[10].

Step 6 of Initial conditions as in clause 6.5.2.2.4.1 in TS 38.521-1 [8] is replaced by the following two steps:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508 [6] clause 4.5.
7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Same test procedure as in clause 6.5.2.2.4.2 in TS 38.521-1 [8] with the following steps exception:

3. Measure the mean power of the UE in the channel bandwidth of the radio access mode according to the test configuration. The period of the measurement shall be at least the continuous duration of one active sub-frame (1ms) and in the uplink symbols. For TDD slots with transient periods are not under test.

6.5B.2.3.1.5 Test requirement

Power of any UE emission shall fulfil requirements in Table 6.5.2.2.5-1 defined in TS 38.521-1 [8] for the NR carrier.6.5B.2.3.2.

6.5B.2.3.2 Additional Spectrum emissions mask for Inter-band EN-DC within FR1

6.5B.2.3.3 Adjacent channel leakage ratio for inter-band EN-DC within FR1

6.5B.2.3.3.1 Test purpose

Same test purpose as in clause 6.5.2.4.1.1 in TS 38.521-1 [8].

6.5B.2.3.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC.

6.5B.2.3.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.2.4.1.3 in TS 38.521-1 [8] for the NR carrier.

The normative reference for this requirement is TS 38.101-3 [4] clause 6.5B.2.3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied

6.5B.2.3.3.4 Test description

Same test description as in clause 6.5.2.4.1.4 in TS 38.521-1 [TBD] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1.

For Initial conditions as in clause 6.5.2.4.1.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS36.521-1[10].

Step 6 of Initial conditions as in clause 6.5.2.4.1.4.1 in TS 38.521-1 [8] is replaced by the following two steps:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Same test procedure as in clause 6.5.2.4.1.4.2 in TS 38.521-1 [8] with the following steps exception:

3. Measure the mean power of the UE in the channel bandwidth of the radio access mode according to the test configuration. The period of the measurement shall be at least the continuous duration of one active sub-frame (1ms) and in the uplink symbols. For TDD slots with transient periods are not under test.

6.5B.2.3.3.5 Test requirement

If the measured adjacent channel power is greater than –50 dBm then the measured NR ACLR shall be higher than the limits in table 6.5.2.4.1.5-2 defined in clause 6.5.2.4.1.5 in TS 38.521-1 [8] for the NR carrier.

6.5B.2.4 Out-of-band emissions for Inter-band EN-DC including FR2

6.5B.2.4.1 Spectrum emissions mask for Inter-band EN-DC including FR2

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.5.2.1 in TS 38.521-2 is incomplete.
- Measurement Uncertainties and Test Tolerances are FFS.

6.5B.2.4.1.1 Test purpose

Same test purpose as in clause 6.5.2.1.1 in TS 38.521-2 [9] for the NR carrier.

6.5B.2.4.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2.

6.5B.2.4.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.2.1.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.5B.2.4.1.4 Test description

6.5B.2.4.1.4.1 Initial conditions

Same test description as in clause 6.5.2.1.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1. For Initial conditions as in clause 6.5.2.1.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5.2.1.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.5.2.1.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.5B.2.4.1.5 Test requirement

Same test requirement as in clause 6.5.2.1.5 in TS 38.521-2 [9] for the NR carrier.

6.5B.2.4.3 Adjacent channel leakage ratio for Inter-band EN-DC including FR2

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.5.2.3 in TS 38.521-2 is incomplete.
- Measurement Uncertainties and Test Tolerances are FFS.

6.5B.2.4.3.1 Test purpose

Same test purpose as in clause 6.5.2.3.1 in TS 38.521-2 [9] for the NR carrier.

6.5B.2.4.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2.

6.5B.2.4.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.2.3.3 in TS 38.521-2 [9] for the NR carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.5B.2.4.3.4 Test description

6.5B.2.4.3.4.1 Initial conditions

Same test description as in clause 6.5.2.3.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1. For Initial conditions as in clause 6.5.2.3.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5.2.3.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.5.2.3.4.2 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.5B.2.4.3.5 Test requirement

Same test requirement as in clause 6.5.2.3.5 in TS 38.521-2 [9] for the NR carrier.

6.5B.3 Spurious emissions for EN-DC

- Editor's note
- Working assumption: E-UTRA is not tested during test procedure.
- Spurious emission for intra-band non-contiguous EN-DC is FFS.

Spurious emissions are emissions which are caused by unwanted transmitter effects such as harmonics emission, parasitic emissions, intermodulation products and frequency conversion products, but exclude out of band emissions. The spurious emission limits are specified in terms of general requirements inline with SM.329 [3] and *NR* operating band requirement to address UE co-existence.

To improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

6.5B.3.1 Spurious Emissions for intra-band contiguous EN-DC

6.5B.3.1.1 General spurious emissions for intra-band contiguous EN-DC

6.5B.3.1.1.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to other channels or other systems in terms of transmitter spurious emissions.

6.5B.3.1.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band EN-DC.

6.5B.3.1.1.3 Minimum conformance requirements

The general spurious emissions requirements specified in sub-clause 6.6.3.1 of TS36.521-1[10] and sub-clause 6.5.3.1 of TS38.521-1[8] apply beyond any frequencies for which the out-of-band emissions requirements in sub-clause 6.5B.2.1 of TS 38.101-3[4] apply.

The normative reference for this requirement is TS 38.101-3 [4] subclause 6.5B.3.1.1.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.5B.3.1.1.4 Test description

6.5B.3.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the Subscriber Station (SS) to take with the UE to reach the correct measurement state.

The initial test configurations for E-UTRA consist of the test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1, with the exception that the E-UTRA channel bandwidth is the lowest supported value in Table 5.3B.1.3-1 for the EN-DC contiguous configuration under test.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and sub-carrier spacing based on NR operating bands specified in table 5.2B.2.1-1. All of these configurations shall be tested with applicable test parameters for each combination of test channel bandwidth and sub-carrier spacing are shown in Table 6.5B.3.1.1.4.1-1 for NR band. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 38.521-1 Annex C2.

Table 6.5B.3.1.1.4.1-1: NR test configuration table

Initial Conditions			
Test Environment as specified in TS 38.508-1 [6] subclause 4.1		Normal	
Test Frequencies as specified in TS 38.508-1 [6] subclause 4.3.1		Mid range	
Test Channel Bandwidths as specified in TS 38.508-1 [6] subclause 4.3.1		Highest N_{RB_agg} (NOTE1, 2)	
Test SCS as specified in Table 5.3.5-1		Lowest	
Test parameters			
	Downlink Configuration	**Uplink Configuration**	
Test ID	N/A for Spurious emission testing.	**Modulation**	**NR RB allocation**
1		CP-OFDM QPSK	Edge_1RB_Left
2		CP-OFDM QPSK	Edge_1RB_Right
3		CP-OFDM QPSK	Outer Full
NOTE 1: Test Channel Bandwidths are checked separately for each NR band, which applicable channel bandwidths are specified in Table 5.3.5-1 of 38.521-1 [8]. NOTE 2: Lowest and highest allowed NR channel BW as specified in Table 5.3B.1.3-1. If the UE supports multiple CC Combinations in the EN-DC Configuration with the same NRB_agg, only the combination with the highest NRB_SCG is tested..			

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.1.1 for TE diagram and section A.3.2.1 for UE diagram.

2. The parameter settings for NR cell are set up according to TS 38.508-1 [6] subclause 4.4.3.

3. The parameter settings for E-URA cell are set up according to TS 36.508 [11] subclause 4.4.3. E-UTRA downlink signal level, and uplink signal level are set according to Table 4.6-1.

4. NR downlink signals are initially set up according to Annex C.0, C.1, and C.2 and uplink signals according to Annex G.0, G.1, G.2, and G.3.0 of TS38.521-1[8].

5. The NR UL Reference Measurement channels are set according to Table 6.5B.3.1.1.4.1-1.

6. Set up the NR and E-UTRA test frequencies so that NR carrier is located at the lower frequency side as specified in Table 5.3B.1.2-1. Repeat each testing with E-UTRA carrier frequency is located at the lower side as specified in Table 5.3B.1.2-1.

7. NR propagation conditions are set according to B.0 of TS38.521-1[8] E-UTRA propagation conditions are set according to B.0 of TS36.521-1[10]..

8. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters *Connectivity* EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.5B.3.1.1.4. 3.

9. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

6.5B.3.1.1.4.2 Test Procedure

1. NR SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format [0_1] for C_RNTI to schedule the UL RMC according to Table 6.5.3.1.4.1-1 of TS38.521-1[8]. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC. 3. NR SS send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at PUMAX level.

4. Measure the mean power of each component carriers for the EN-DC configuration, which shall meet the requirements described in table Table 6.2B.1.2.5-1. The period of the measurement shall be at least the continuous duration of one sub-frame (1ms).

5. Measure the power of the transmitted signal with a measurement filter of bandwidths according to table 6.5B.3.1.1.5-1. The centre frequency of the filter shall be stepped in contiguous steps according to table 6.5B.3.1.1.5-1. The measured power shall be verified for each step. The measurement period shall capture the active time slots

6.5B.3.1.1.4.3 Message Contents

Message contents are according to TS 38.508-1 [5] subclause 4.6

6.5B.3.1.1.5 Test Requirement

The measured average power of spurious emission, derived in step 5, shall not exceed the described value in Table 6.5B.3.1.1.5-1.

Unless otherwise stated, the spurious emission limits apply for the frequency ranges that are more than Δf_{OOB} (MHz) from the edge of the channel bandwidth shown in Table 6.5.3.1.5-1 of TS38.521-1[8].

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

Table 6.5B.3.1.1.5-1: General spurious emissions test requirements

Frequency Range	Maximum Level	Measurement bandwidth	NOTE
9 kHz ≤ f < 150 kHz	-36 dBm	1 kHz	
150 kHz ≤ f < 30 MHz	-36 dBm	10 kHz	
30 MHz ≤ f < 1000 MHz	-36 dBm	100 kHz	
1 GHz ≤ f < 12.75 GHz	-30 dBm	1 MHz	
	-25 dBm	1 MHz	3
12.75 GHz ≤ f < 5th harmonic of the upper frequency edge of the UL operating band in GHz	-30 dBm	1 MHz	1
12.75 GHz < f < 26 GHz	-30 dBm	1 MHz	2
NOTE 1: Applies for Band that the upper frequency edge of the UL Band more than 2.69 GHz. NOTE 2: Applies for Band that the upper frequency edge of the UL Band more than 5.2 GHz. NOTE 3: Applies for Band n41, CA configurations including Band n41, and EN-DC configurations that include n41 specified in sub-clause 5.2B of [4] when NS_04 is signalled.			

6.5B.3.1.2 Spurious emission band UE co-existence for intra-band contiguous EN-DC

6.5B.3.1.2.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to other channels or other systems in terms of transmitter spurious emissions for band UE co-existence for intra-band contiguous EN-DC.

6.5B.3.1.2.2 Test applicability

This test case applies to all types of NR UE release 15 and forward supporting intra-band contiguous EN-DC.

6.5B.3.1.2.3 Minimum conformance requirements

This clause specifies the requirements for the specified EN-DC configurations for coexistence with protected bands.

The requirements in Table 6.5B.3.1.2.3-1 apply on each component carrier with all component carriers are active.

Table 6.5B.3.1.2.3-1: 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)71B	E-UTRA Band 4, 5, 12, 13, 14, 17, 24, 26, 30, 48, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 2, 25, 41, 70	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 29	$F_{DL\_low}F_{DL\_low}$	- -	$F_{DL\_high}F_{DL\_high}$	-38	1	3
	E-UTRA Band 71	F_{DL_low}	-	F_{DL_high}	-50	1	3
…	E-UTRA Band 40	F_{DL_low}	-	F_{DL_high}	[-40]	1	

NOTE 1: F_{DL_low} and F_{DL_high} refer to each E-UTRA frequency band specified in Table 5. 2-1 of TS36.121-1[10].

NOTE 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.5B.3.1.1.5-1are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd, 3rd, 4th or 5th harmonic spurious emissions. Due to spreading of the harmonic emission the exception is also allowed for the first 1 MHz frequency range immediately outside the harmonic emission on both sides of the harmonic emission. This results in an overall exception interval centred at the harmonic emission of (2MHz + N x L_{CRB} x 180kHz), where N is 2, 3, 4, 5 for the 2nd, 3rd, 4th or 5th harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval.

NOTE 3: These requirements also apply for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1-1 and Table 6.6.3.1A-1 [2] from the edge of the channel bandwidth.

The normative reference for this requirement is TS 38.101-3 [4] subclause 6.5B.3.1.2.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

6.5B.3.1.2.4 Test description

6.5B.3.1.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.2B.2.1, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC configuration specified in clause 5.3B.1.2 and are shown in table 6.5B.3.1.2.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 6.5B.3.1.2.4.1-1: Test configuration table

Initial Conditions					
Test Environment as specified in TS 38.508-1 [6] subclause 4.1		NC			
Test Frequencies as specified in TS 38.508-1 [6] subclause 4.3.1		Low range, High range			
Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1		Lowest and Highest N_{RB_agg} (Note 3)			
Test SCS for the NR cell as specified in TS 38.521-1 [8] Table 5.3.5-1		Lowest SCS per Channel Bandwidth			
Test Parameters					
Test ID	**Downlink Configuration**	**EN-DC Uplink Configuration**			
		E-UTRA Cell		**NR Cell**	
		Modulation	**RB allocation (NOTE 2)**	**Modulation**	**RB allocation (NOTE 1)**
1	N/A for Spurious emission.	QPSK	Outer_Full	CP-OFDM QPSK	Edge_1RB_Left
2		QPSK	Outer_Full	CP-OFDM QPSK	Edge_1RB_Right
3		QPSK	Outer_Full	CP-OFDM QPSK	Outer Full
Note 1: The specific configuration of each RB allocation is defined in Table 6.1-1 in TS 38.521-1 [8]. Note 2: Outer_Full defined as the transmission bandwidth configuration N_{RB} per channel bandwidth for the E-UTRA component as indicated in TS 36.521-1 [10] Table 5.4.2-1. Note 3: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same aggregated channel BW, only the combination with the highest NR BW is tested.					

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.1.1 for TE diagram and section A.3.2.1 for UE diagram.

2. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] subclause 4.4.3.

3. E-UTRA downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0 of TS 36.521-1 [10].

4. NR downlink signals are initially set up according to Annex C.0, C.1 and C.2, and uplink signals according to Annex G.0, G.1, G.2, G.3.0 of TS 38.521-1 [8].

5. The UL Reference Measurement channels are set up accordiong to TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.

6. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG, respectively.

7. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.5B.3.1.2.4.3.

6.5B.3.1.2.4.2 Test Procedure

1. E-UTRA SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.6.3.1.4.1-1 of TS36.521-1[10]. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

2. NR SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format [0_1] for C_RNTI to schedule the UL RMC according to Table 6.5.3.1.4.1-1 of TS38.521-1[8]. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

3. Both NR and E-UTRA SS send continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at P_{UMAX} level.

4. Measure the mean power of each component carriers for the EN-DC configuration, which shall meet the requirements described in table Table 6.2B.1.2.5-1. The period of the measurement shall be at least the continuous duration of one sub-frame (1ms).

5. Measure the power of the transmitted signal with a measurement filter of bandwidths according to table Table 6.5B.3.1.2.3-1. The centre frequency of the filter shall be stepped in contiguous steps according to table 6.5B.3.1.2.3-1. The measured power shall be verified for each step. The measurement period shall capture the active time slots.

6.5B.3.2.1.4.3 Message Contents

Message contents are according to TS 38.508-1 [5] subclause 4.6.

6.5B.3.1.2.5 Test Requirement

Test requirements for Spurious Emissions UE Co-existence for intra-band contiguous EN-DC are the same as described in minimum requirements and are not repeated in this section.

6.5B.3.2 Spurious Emissions for intra-band non-contiguous EN-DC

Editor's Note: Wgap is TBD in TS 38.101-3 for this test case

6.5B.3.2.1 General spurious emissions for Intra-band non-contiguous EN-DC

6.5B.3.2.1.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to other channels or other systems in terms of transmitter spurious emissions.

6.5B.3.2.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward supporting intra-band non-contiguous EN-DC.

6.5B.3.2.1.3 Minimum conformance requirements

The general spurious emissions requirements specified in sub-clause 6.6.3.1 of TS36.521-1[10] and sub-clause 6.5.3.1 of TS38.521-1[8] apply beyond any frequencies for which the out-of-band emissions requirements in sub-clause 6.5B.2.2 of TS 38.101-3[4] apply.

The normative reference for this requirement is TS 38.101-3 [4] subclause 6.5B.3.2.1.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.5B.3.2.1.4 Test description

6.5B.3.2.1.4.1 Initial Conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations for E-UTRA consist of the test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1, with the exception that the E-UTRA channel bandwidth is the lowest supported value in Table 5.3B.1.3-1 for the EN-DC non-contiguous configuration under test and parameters specified in Table 6.5B.3.2.1.4.1-1.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and sub-carrier spacing based on NR operating bands specified in table 5.2B.2.1-1. All of these configurations shall be tested with applicable test parameters for each combination of test channel bandwidth and sub-carrier spacing are shown in Table 6.5B.3.2.1.4.1-1 for NR band. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 38.521-1 Annex C2.

Table 6.5B.3.2.1.4.1-1: Test configuration table

Initial Conditions			
Test Environment as specified in TS 38.508-1 [6] subclause 4.1		Normal	
Test Frequencies as specified in TS 38.508-1 [6] subclause 4.3.1		MaxWGap	
Test Channel Bandwidths as specified in TS 38.508-1 [6] subclause 4.3.1		Highest N_{RB_agg} (NOTE1, 2)	
Test SCS as specified in Table 5.3.5-1		Lowest	
Test parameters			
	Downlink Configuration	**Uplink Configuration**	
Test ID	N/A for Spurious emission testing.	**Modulation**	**NR RB allocation**
1		CP-OFDM QPSK	Edge_1RB_Left
2		CP-OFDM QPSK	Edge_1RB_Right
3		CP-OFDM QPSK	Outer Full
NOTE 1: Test Channel Bandwidths are checked separately for each NR band, which applicable channel bandwidths are specified in Table 5.3.5-1 of 38.521-1 [8]. NOTE 2: Lowest and highest allowed NR channel BW as specified in Table 5.3B.1.3-1. If the UE supports multiple CC Combinations in the EN-DC Configuration with the same NRB_agg, only the combination with the highest NRB_SCG is tested.			

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.1.1 for TE diagram and section A.3.2.1 for UE diagram.

2. The parameter settings for NR cell are set up according to TS 38.508-1 [6] subclause 4.4.3.

3. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3. E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1. and propagation conditions are set according to Annex B.0 of TS36.521-1[10].

4. NR downlink signals are initially set up according to Annex C.0, C.1, and C.2 and uplink signals according to Annex G.0, G.1, G.2, and G.3.0 of TS38.521-1[8].

5. The UL Reference Measurement channels for NR are set according to Table 6.5B.3.2.1.4.1-1.

6. NR propagation conditions are set according to Annex B.0 of TS 38.521-1 [8].

7 .Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.5B.3. 2.1.4. 3.

8 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

6.5B.3.2.1.4.2 Test Procedure

1. NR SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format [0_1] for C_RNTI to schedule the UL RMC according to Table 6.5.3.1.4.1-1 of TS38.521-1[8]. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

2. NR carrier sends continuously uplink power control "up" commands in the uplink scheduling information to the UE until the UE transmits at PUMAX level.

3. Measure the power of the transmitted NR signal with a measurement filter of bandwidths according to table 6.5.3.1.5-1 in TS 38.521-1 [8]. The centre frequency of the filter shall be stepped in contiguous steps according to table 6.5.3.1.5-1 in TS 38.521-1 [8]. The measured power shall be verified for each step. The measurement period shall capture the active time slots.

6.5B.3.2.1.4. 3 Message Contents

Message contents are according to TS 38.508-1 [5] subclause 4.6.

6.5B.3.2.1.5 Test Requirement

Same test requirement as in clause 6.5B.3.1.1.5.

6.5B.3.2.2 Spurious emission band UE co-existence for intra-band non-contiguous EN-DC

Editor's note: Wgap for intra-band non-contiguous EN-DC is FFS in TS 38.508-1.

6.5B.3.2.2.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to other channels or other systems in terms of transmitter spurious emissions for band UE co-existence for intra-band non-contiguous EN-DC.

6.5B.3.2.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward supporting intra-band non-contiguous EN-DC.

6.5B.3.2.2.3 Minimum conformance requirements

This clause specifies the requirements for the specified EN-DC configurations for co-existence with protected bands.

The requirements in Table 6.5B.3.2.2.3-1 apply with all component carriers are active.

Table 6.5B.3.2.2.3-1: Requirements for intra-band non-contiguous EN-DC

EN-DC Configuration	Spurious emission						
	Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)	NOTE
…							
DC_41A_n41A	E-UTRA Band 1, 2, 3, 4, 5, 8, 10, 12, 13 , 14, 17, 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	
	E-UTRA Band 30, 40	F_{DL_low}	-	F_{DL_high}	[-40]	1	
…							

NOTE 1: F_{DL_low} and F_{DL_high} refer to each E-UTRA frequency band specified in Table 5. 2-1 of TS36.121-1[10].
NOTE 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.5.3.1.3-2 of TS38.521-1[8] are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd, 3rd, 4th or 5th harmonic spurious emissions. Due to spreading of the harmonic emission the exception is also allowed for the first 1 MHz frequency range immediately outside the harmonic emission on both sides of the harmonic emission. This results in an overall exception interval centred at the harmonic emission of (2MHz + N x L_{CRB} x 180kHz), where N is 2, 3, 4, 5 for the 2nd, 3rd, 4th or 5th harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval
NOTE 3: Applicable when co-existence with PHS system operating in 1884.5 - 1915.7 MHz.
NOTE 4: This requirement applies when the NR carrier is confined within 2545-2575MHz or 2595-2645MHz and the channel bandwidth is 10 or 20 MHz.

The normative reference for this requirement is TS 38.101-3 [4] subclause 6.5B.3.2.2.

Exception requirements are applicable for NR but not for E-UTRA within this test. LTE anchor agnostic approach is not applied. E-UTRA configuration is included but E-UTRA measurements are not performed.

6.5B.3.2.2.4 Test description

6.5B.3.2.2.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and sub-carrier spacing based on NR operating bands specified in table 5.2B.2.1-1. All of these configurations shall be tested with applicable test parameters for each combination of test channel bandwidth and sub-carrier spacing are shown in Table 6.5B.3.2.2.4.1-1 for E-UTRA and Table 6.5B.3.2.2.4.1-2 for NR. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex TS 36.521-1 [10] Annex C and in TS 38.521-1 Annex C2 for LTE link and NR link respectively.

Table 6.5B.3.2.2.4.1-1: Test configuration table

<table>
<tr><th colspan="6">Initial Conditions</th></tr>
<tr><td colspan="2">Test Environment
as specified in TS 38.508-1 [6] subclause 4.1</td><td colspan="4">NC</td></tr>
<tr><td colspan="2">Test Frequencies
as specified in TS 38.508-1 [6] subclause 4.3.1</td><td colspan="4">Low range, High range</td></tr>
<tr><td colspan="2">Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1</td><td colspan="4">Lowest and Highest N_{RB_agg}
(Note 3)</td></tr>
<tr><td colspan="2">Test SCS for the NR cell as specified in TS 38.521-1 [8] Table 5.3.5-1</td><td colspan="4">Lowest SCS per Channel Bandwidth</td></tr>
<tr><th colspan="6">Test Parameters</th></tr>
<tr><th rowspan="3">Test ID</th><th rowspan="3">Downlink Configuration</th><th colspan="4">EN-DC Uplink Configuration</th></tr>
<tr><th colspan="2">E-UTRA Cell</th><th colspan="2">NR Cell</th></tr>
<tr><th>Modulation</th><th>RB allocation (NOTE 2)</th><th>Modulation</th><th>RB allocation (NOTE 1)</th></tr>
<tr><td>1</td><td rowspan="3">N/A for Spurious emission.</td><td>QPSK</td><td>Outer_Full</td><td>CP-OFDM QPSK</td><td>Edge_1RB_Left</td></tr>
<tr><td>2</td><td>QPSK</td><td>Outer_Full</td><td>CP-OFDM QPSK</td><td>Edge_1RB_Right</td></tr>
<tr><td>3</td><td>QPSK</td><td>Outer_Full</td><td>CP-OFDM QPSK</td><td>Outer Full</td></tr>
<tr><td colspan="6">Note 1: The specific configuration of each RB allocation is defined in Table 6.1-1 in TS 38.521-1 [8].
Note 2: Outer_Full defined as the transmission bandwidth configuration N_{RB} per channel bandwidth for the E-UTRA component as indicated in TS 36.521-1 [10] Table 5.4.2-1.
Note 3: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same aggregated channel BW, only the combination with the highest NR BW is tested.</td></tr>
</table>

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [6] Annex A, Figure A.3.1.1.1 for SS diagram and section A.3.2.1 for UE diagram.

2. The parameter settings for the cell are set up according to TS 38.508-1 [6] subclause 4.4.3.

3. E-UTRA downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0 of TS 36.521-1 [10].

4. NR downlink signals are initially set up according to Annex C.0, C.1 and C.2, and uplink signals according to Annex G.0, G.1, G.2, G.3.0 of TS 38.521-1 [8].

5. The UL Reference Measurement channels are set according to TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.

6. For each EN-DC combination specified in Table 5.3B.1.3-1, channel spacing between NR and E-UTRA is specified according to subclause 5.4B.1.

7. Propagation conditions are set according to TS 36.521-1 [10] Annex B and TS 38.521-1 [8] Annex B for E-UTRA link and NR link respectively.

8. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.5B.3.2.2.4.3.

6.5B.3.2.2.4.2 Test Procedure

1. E-UTRA SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.5B.3.2.2.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

2. NR SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format [0_1] for C_RNTI to schedule the UL RMC according to Table 6.5B.3.2.2.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

3. Send continuously uplink power control "up" commands to the UE for both NR and E-UTRA carriers until the UE transmits at its P_{UMAX} level; allow at least 200 ms starting from the first TPC command in this step for the UE to reach P_{UMAX} level.

4. Measure the mean power of each component carriers for the EN-DC configuration, which shall meet the requirements described in Table 6.2B.1.2.5-1. The period of the measurement shall be at least the continuous duration of one sub-frame (1ms).

5. Measure the power of the transmitted signal with a measurement filter of bandwidths according to table 6.5B.3.2.2.3-1. The centre frequency of the filter shall be stepped in contiguous steps according to the same table. The measured power shall be recorded for each step. The measurement period shall capture the active time slots.

6.5B.3.2.2.4.3 Message Contents

Message contents are according to TS 38.508-1 [5] subclause 4.6.

6.5B.3.2.2.5 Test Requirement

Test requirements for Spurious Emissions UE Co-existence for intra-band non-contiguous EN-DC are the same as the minimum requirements described in subclause 6.5B.3.2.2.3 and are not repeated in this section.

6.5B.3.3 Spurious Emissions for Inter-band EN-DC within FR1

6.5B.3.3.1 General spurious emissions for Inter-band EN-DC within FR1

6.5B.3.3.1.1 Test purpose

Same test purpose as in clause 6.5B.3.1.1.1.

6.5B.3.3.1.2 Test applicability

This test case applies to all types of NR UE release 15 and forward supporting inter-band EN-DC.

6.5B.3.3.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5B.3.1.1.3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

6.5B.3.3.1.4 Test description

6.5B.3.3.1.4.1 Initial condition

Same initial conditions as in clause 6.5B.3.1.1 with the following exceptions:

Instead of Table Table 6.5B.3.1.1.4.1-1 → use Table 6.5B.3.3.1.4-1

Table 6.5B.3.3.1.4-1: NR test configuration table

Initial Conditions			
Test Environment as specified in TS 38.508-1 [6] subclause 4.1		Normal	
Test Frequencies as specified in TS 38.508-1 [6] subclause 4.3.1		Low range, High range	
Test Channel Bandwidths as specified in TS 38.508-1 [6] subclause 4.3.1		Lowest and Highest N_{RB_agg} (Note 2)	
Test SCS as specified in Table 5.3.5-1		Lowest	
Test parameters			
	Downlink Configuration	**Uplink Configuration**	
Test ID	N/A for Spurious emission testing.	**Modulation**	**NR RB allocation**
1		CP-OFDM QPSK	Edge_1RB_Left
2		CP-OFDM QPSK	Edge_1RB_Right
3		CP-OFDM QPSK	Outer Full
Note 1: Test Channel Bandwidths are checked separately for each NR band, which applicable channel bandwidths are specified in Table 5.3.5-1 of 38.521-1 [8]. Note 2: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same aggregated channel BW, only the combination with the highest NR BW is tested			

Same test procedure as in clause 6.5.3.1.4.2 in TS 38.521-1 [8].

6.5B.3.3.1.4.2 Test procedure

Same test procedure as in clause 6.5B.3.1.1.4.2.

6.5B.3.3.1.4.3 Message Contents

Same message Contents as in clause 6.5B.3.1.1.4.3.

6.5B.3.3.1.5 Test Requirement

Same test requirement as in clause 6.5B.3.1.1.5.

6.5B.3.3.2 Spurious emission band UE co-existence for Inter-band within FR1

6.5B.3.3.2.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to other channels or other systems in terms of transmitter spurious emissions for band UE co-existence for inter-band EN-DC.

6.5B.3.3.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward supporting inter-band EN-DC.

6.5B.3.3.2.3 Minimum conformance requirements

The general spurious emissions requirements specified in sub-clause 6.6.3.1 of TS36.521-1[11] and sub-clause 6.5.3.1 of TS38.521-1[8] apply beyond any frequencies for which the out-of-band emissions requirements in sub-clause 6.5B.2.3 apply.

NOTE 1: 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.

For inter-band EN_DC with the uplink assigned to both carriers, the requirements in Table 6.5B.3.3.2.3-1 apply on each component carrier with both component carriers are active.

Table 6.5B.3.3.2.3-1: Requirements

EN-DC Configuration	Spurious emission						
	Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)	NOTE
DC_1_n28	E-UTRA Band 18, 19, 27, 31, 32, 72 NR band n5, n7, n8, n20, n26, n38, n40, n41, n50, n51, n74	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band42, 43 NR band n78, n75, n76	F_{DL_low}	-	F_{DL_high}	-50	1	2
	NR band n3, n34	F_{DL_low}	-	F_{DL_high}	-50	1	5
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	9, 11
	E-UTRA Band 65 NR band n1	F_{DL_low}	-	F_{DL_high}	-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
	Frequency range	1839.9	-	1879.9	-50	1	5
	Frequency range	1884.5	-	1915.7	-41	0.3	9, 15
DC_1_n40	Band 1, 5, 7, 8, 11, 18, 19, 20, 21, 22, 26, 27, 28, 31, 32, 38, 40, 41, 42, 43, 44, 45, 50, 51, 52, 65, 67, 68, 69, 72, 73, 74, 75, 76	F_{DL_low}	-	F_{DL_high}	-50	1	
	Band 3, 34	F_{DL_low}	-	F_{DL_high}	-50	1	5
	Frequency range	1880		1895	-40	1	5, 17
	Frequency range	1895		1915	-15.5	5	5, 7, 17
	Frequency range	1915		1920	+1.6	5	5, 7, 17
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_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3, 34	F_{DL_low}	-	F_{DL_high}	-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 NR Band n77, n78, n79,	F_{DL_low}	-	F_{DL_high}	-50	1	2
DC_1_n77	E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 20, 21, 26, 28, 34, 39, 40, 41, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1880	-	1895	-40	1	5, 8
	Frequency range	1895	-	1915	-15.5	5	5, 7, 8
	Frequency range	1915	-	1920	+1.6	5	5, 7, 8
DC_1_n78 DC_1_n84_ULSUP-TDM_n78 DC_1_n84_ULSUP-FDM_n78	E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 20, 21, 26, 28, 34, 40, 41, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1880	-	1895	-40	1	5, 8
	Frequency range	1895	-	1915	-15.5	5	5, 7, 8
	Frequency range	1915	-	1920	+1.6	5	5, 7, 8
DC_1_n79	E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 21, 26, 28, 34, 40, 41, 42, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1880	-	1895	-40	1	5, 8
	Frequency range	1895	-	1915	-15.5	5	5, 7, 8
	Frequency range	1915	-	1920	+1.6	5	5, 7, 8
DC_2_n5	Bands 4, 5, 10, 12, 13, 14, 17, 24, 28, 29, 30, 42, 48, 50, 51, 66, 70, 71, n71, 74, 85	F_{DL_low}	-	F_{DL_high}	-50	1	
	Bands 2, 25, 48	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 26	859	-	869	-27	1	
	E-UTRA Band 41, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
DC_2_n66	Bands 4, 5, 10, 12, 13, 14, 17, 24, 26, 27, 28, 29, 30, 41, 50, 51, 66, 70, 71, n71, 74, 85	F_{DL_low}	-	F_{DL_high}	-50	1	
	Bands 2, 25	F_{DL_low}	-	F_{DL_high}	-50	1	5
	Bands 42, 48	F_{DL_low}	-	F_{DL_high}	-50	1	2

DC_2_n71	E-UTRA Band 4, 5, 12, 13, 14, 17, 24, 26, 29, 30, 48, 66	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 2, 25, 41, 70	F_{DL_low}	-	F_{DL_high}	-50	1	2
	NR Band n71	F_{DL_low}	-	F_{DL_high}	-50	1	5
DC_2_n78	E-UTRA Band 4, 5, 10, 12, 13, 14, 17, 24, 26, 27, 28, 29, 30, 41, 42, 48, 50, 51, 66, 70, 71, 74, 85	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 2, 25	F_{DL_low}	-	F_{DL_high}	-50	1	2
	NR Band 78	F_{DL_low}	-	F_{DL_high}	-50	1	5
	NR Band n257	26500	-	29500	-5	100	
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 NR Band n1, n5, n7, n8, n20, n28, n50, n51, n74, n75, n76	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3	F_{DL_low}	-	F_{DL_high}	-50	1	5
	E-UTRA band 22, 42	F_{DL_low}	-	F_{DL_high}	-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 42, 43, 65 NR band n1, n50, n51, n74, n75, n76, n78	F_{DL_low}	-	F_{DL_high}	-50	1	2
	NR band n1	F_{DL_low}	-	F_{DL_high}	-50	1	9, 10
	NR band n3	F_{DL_low}	-	F_{DL_high}	-50	1	5
	E-UTRA Band 27, 31, 72 NR band n5, n7, n8, n20, n26, n34, n38, n40, n41	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 11, 18, 19, 21	F_{DL_low}	-	F_{DL_high}	-50	1	13
	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	Band 1, 5, 7, 8, 20, 26, 27, 28, 31, 32, 33, 34, 38, 39, 41, 43, 44. 45, 50, 51, 65, 67, 68, 69, 72, 73, 75, 76	F_{DL_low}	-	F_{DL_high}	-50	1	
	Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	5
	Band 22, 42, 52	F_{DL_low}	-	F_{DL_high}	-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, 48, 67, 68, 69, 72, 73	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3	F_{DL_low}	-	F_{DL_high}	-50	1	5
	E-UTRA Band 1, 5, 6, 22, 26, 30, 34, 36, 40, 41, 42, 43, 44, 46, 65, 71	F_{DL_low}	-	F_{DL_high}	-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	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	3
DC_3_n78 DC_3_n80_ULSUP-TDM_n78, DC_3_n80_ULSUP-FDM_n78	E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 20, 21, 26, 28, 34, 39, 40, 41, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	3
DC_3_n79 DC_3_n79 DC_3_n80_ULSUP-TDM_n79, DC_3_n80_ULSUP-FDM_n79	E-UTRA Band 1, 3, 5, 8, 11, 18, 19, 21, 28, 34, 39, 40, 41, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Frequency range	1884.5	-	1915.7	-41	0.3	3
DC_3_n82	E-UTRA Band 1, 3 7, 8, 20, 22, 31, 32, 33, 34, 38, 40, 43, 50, 51, 65, 67, 68, 69, 72,74, 75, 76	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 42	F_{DL_low}	-	F_{DL_high}	-50	1	2
DC_5_n40	Band 1, 3, 5, 7, 8, 28, 31, 34, 38, 42, 43, 45, 65, 73	F_{DL_low}	-	F_{DL_high}	-50	1	
	Band 26	859	-	869	-27	1	
	Band 41, 52	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	3
DC_5_n66	Bands 1, 2, 3, 4, 5, 6, 7, 8, 10, 12, 13, 14, 17, 24, 25, 28, 29, 30, 34, 38, 40, 43, 45, 50, 51, 65, 66, 70, 71, n71, 85	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 26	859	-	869	-27	1	

	Bands 41, 42, 48, 52	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 18, 19	F_{DL_low}	-	F_{DL_high}	-40	1	
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	3
DC_5_n78	E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 12, 13, 14, 17, 24, 25, 28, 29, 30, 31, 34, 38, 40, 42, 43, 45, 48, 65, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	3800	-	3805	+1.6	5	5, 7, 8
	Frequency range	3805	-	3825	-15.5	5	5, 7, 8
	Frequency range	3825	-	3850	-40	1	5, 8
	Frequency range	3850	-	4200	-50	1	
	E-UTRA Band 26	859	-	869	-27	1	
	Frequency range	945	-	960	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	3, 4
	Frequency range	2545	-	2575	-50	1	
	Frequency range	2595	-	2645	-50	1	
	E-UTRA Band 41	F_{DL_low}	-	F_{DL_high}	-50	1	7
	E-UTRA Band 18, 19	F_{DL_low}	-	F_{DL_high}	-40	1	4
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	4
DC_7_n28	E-UTRA Band 27, 31, 72 NR band n2, n3, n5, n7, n8, n20, n26, n34, n40	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 4, 10, 42, 43, 65 NR band n1, n50, n51, n66, n74, n75, n76, n78	F_{DL_low}	-	F_{DL_high}	-50	1	2
	NR band n1	F_{DL_low}	-	F_{DL_high}	-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_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	2570	-	2575	+1.6	5	5, 7, 16
	Frequency range	2575	-	2595	-15.5	5	5, 7, 16
	Frequency range	2595	-	2620	-40	1	5, 21
	E-UTRA Band 1, 4, 10, 12, 13, 14, 17, 20, 22, 23, 27, 28, 29, 42, 43, 44, 46, 65, 66, 67, 68 NR Band n77, n78, n79,	F_{DL_low}	-	F_{DL_high}	-50	1	2
DC_7_n78	E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 11, 18, 19, 20, 21, 26, 27, 28, 31, 32, 33, 34, 40, 50, 51, 65, 66, 67, 68, 72, 74, 75, 76	F_{DL_low}	-	F_{DL_high}	-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	Band 1, 20, 28, 31, 32, 33, 34, 38, 39, 40, 45, 50, 51, 65, 67, 68, 69, 72, 73, 74, 75, 76	F_{DL_low}	-	F_{DL_high}	-50	1	
	Band 3, 7, 22, 41, 42, 43, 52	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Band 8	F_{DL_low}	-	F_{DL_high}	-50	1	5
	Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	12
	Frequency range	860	-	890	-40	1	5, 12
	Frequency range	1884.5	-	1915.7	-41	0.3	3 , 12
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_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA band 3, 7, 22, 41	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 8	F_{DL_low}	-	F_{DL_high}	-50	1	5
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-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 DC_8_n81_ULSUP-TDM_n78, DC_8_n81_ULSUP-FDM_n78	E-UTRA Band 1,8, 20, 28, 34, 39, 40, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3, 7,41	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-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 DC_8_n81_ULSUP-TDM_n79,	E-UTRA Band 1,8,28,34,39,40,65	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 3,41,42	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	12
	Frequency range	860	-	890	-40	1	5, 12

DC_8_n81_ULSUP-FDM_n79	Frequency range	1884.5	-	1915.7	-41	0.3	3
DC_11_n77	E-UTRA Band 1, 3, 18, 19, 28, 34, 65	F_{DL_low}	-	F_{DL_high}	-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_n78	E-UTRA Band 1, 3, 18, 19, 28, 34, 65	F_{DL_low}	-	F_{DL_high}	-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, 18, 19, 28, 34, 42, 65	F_{DL_low}	-	F_{DL_high}	-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	Bands 2, 5, 12, 13, 14, 17, 24, 25, 30, 42, 43 50, 51, 71, n71, 74	F_{DL_low}	-	F_{DL_high}	-50	1	
	Bands 4, 10, 41, 48, 66, 70	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Band 26	859	-	869	-27	1	
	Band 12, 85	F_{DL_low}	-	F_{DL_high}	-50	1	
DC_12_n66 DC_12_n5	Bands 2, 4, 5, 13, 14, 17, 24, 25, 26, 27, 29, 30, 41, 50, 51, 70, 71, n71, 74, n257	F_{DL_low}	-	F_{DL_high}	-50	1	
	Bands 4, 10, 48	F_{DL_low}	-	F_{DL_high}	-50	1	2
	Bands 12, 85	F_{DL_low}	-	F_{DL_high}	-50	1	5
	Bands 2, 5, 12, 13, 14, 17, 24, 25, 30, 42, 43 50, 51, 71, n71, 74, n257	F_{DL_low}	-	F_{DL_high}	-50	1	
DC_18_n77	E-UTRA Band 1, 3, 11, 21, 28, 34, 65	F_{DL_low}	-	F_{DL_high}	-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, 65	F_{DL_low}	-	F_{DL_high}	-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, 42, 65	F_{DL_low}	-	F_{DL_high}	-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, 65	F_{DL_low}	-	F_{DL_high}	-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, 65	F_{DL_low}	-	F_{DL_high}	-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, 42, 65	F_{DL_low}	-	F_{DL_high}	-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, 3, 7, 22, 28, 31, 32, 34, 38, 42, 43, 65, 75, 76, n78	F_{DL_low}	-	F_{DL_high}	-50	1	
DC_20_n28 DC_20_n83	E-UTRA Band 1, 3, 7, 8, 22, 31, 32, 34, 38, 42, 43, 65, 75, 76	F_{DL_low}	-	F_{DL_high}	-50	1	
DC_20_n51	E-UTRA Band 1, 3, 4, 8, 17, 22, 28, 29, 31, 40, 43, 48, 65, 66, 68, 72	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 20	F_{DL_low}	-	F_{DL_high}	-50	1	5
	Frequency range	758	-	788	-50	1	

	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_{DL_low}	-	F_{DL_high}	-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						
	E-UTRA Band 20	F_{DL_low}	-	F_{DL_high}	-50	1	5
	E-UTRA Band 38, 69	F_{DL_low}	-	F_{DL_high}	-50	1	2
DC_20_n78 DC_20_n82_ULSUP-TDM_n78, DC_20_n82_ULSUP-FDM_n78	E-UTRA Band 1, 3, 7, 8 22,, 31, 32, 33, 34, 40, 42, 43, 50, 51, 65, 67, 68, 72, 74, 75, 76						
	E-UTRA Band 20	F_{DL_low}	-	F_{DL_high}	-50	1	5
	E-UTRA Band 38, 69	F_{DL_low}	-	F_{DL_high}	-50	1	2
DC_21_n77	E-UTRA Band 1, 3, 18, 19, 21, 28, 34, 65	F_{DL_low}	-	F_{DL_high}	-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, 65	F_{DL_low}	-	F_{DL_high}	-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, 42, 65	F_{DL_low}	-	F_{DL_high}	-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	NR band n5, n28, n66, n71 E-UTRA/NR Band 4, 10, 12, 13, 14, 17, 24, 26, 27, 29, 30, 42, 45, 48, 70	F_{DL_low}	-	F_{DL_high}	-50	1	
	NR band n2 E-UTRA/NR Band 25	F_{DL_low}	-	F_{DL_high}	-50	1	5
	EUTRA/NR Band 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
DC_26_n41	E-UTRA/NR Band 1, 2, 3, 4, 5, 10, 12, 13 , 14, 17, 24, 25, 26, 28, 29, 30, 31, 34, 39, 40, 42, 43, 48, 50, 51, 65, 66, 70, 71, 74	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 9, 11, 18, 19, 21	F_{DL_low}	-	F_{DL_high}	-50	1	19
	Frequency range	1884.5		1915.7	-41	0.3	3, 19
	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, 11, 21, 28, 34, 65	F_{DL_low}	-	F_{DL_high}	-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_26_n78	E-UTRA Band 1, 3, 11, 21, 28, 34, 65	F_{DL_low}	-	F_{DL_high}	-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_26_n79	E-UTRA Band 1, 3, 11, 21, 28, 34, 42, 65	F_{DL_low}	-	F_{DL_high}	-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_28_n51	E-UTRA Band 2, 3, 5, 7, 8, 25, 26, 31, 34, 38, 40, 41, 66, 72	F_{DL_low}	-	F_{DL_high}	-50	1	

	E-UTRA Band 4, 10, 20, 22, 24, 32, 42, 43, 45, 46, 65, 66, 71, 73 NR band n78, n79	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 1	F_{DL_low}	-	F_{DL_high}	-50	1	2, 9, 11
	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_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 1, 65	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 1	F_{DL_low}	-	F_{DL_high}	-50	1	9, 10
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	9, 11
	Frequency range	758	-	773	-32	1	
	Frequency range	773	-	803	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	3
DC_28_n78 DC_28_n83_ULSUP-TDM_n78, DC_28_n83_ULSUP-FDM_n78	E-UTRA Band 3, 5, 7, 8, 18, 19, 20, 26, 34, 39, 40, 41	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 1, 65	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 1	F_{DL_low}	-	F_{DL_high}	-50	1	10, 11
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	10, 12
	Frequency range	758	-	773	-32	1	
	Frequency range	773	-	803	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	3
	NR Band n257	26500	-	29500	-5	100	
DC_28_n79	E-UTRA Band 3, 5, 8, 18, 19, 34, 39, 40, 41, 42	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 1, 65	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 1	F_{DL_low}	-	F_{DL_high}	-50	1	9, 10
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	9, 11
	Frequency range	758	-	773	-32	1	
	Frequency range	773	-	803	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	3
DC_30_n5	Bands 1, 2, 3, 4, 5, 7, 8, 10, 12, 13, 14, 17, 24, 25, 28, 29, 30, 31, 34, 38, 40, 42, 43, 45, 48, 50, 51, 65, 66, 70, 71, 73, 74, 85	F_{DL_low}	-	F_{DL_high}	-50	1	
	Band 26	859	-	869	-27	1	
	Bands 41, 48, 52	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 18, 19	F_{DL_low}	-	F_{DL_high}	-40	1	
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	3
DC_30_n66	Bands 2, 4, 5, 10, 12, 13, 14, 17, 24, 25, 26, 27, 29, 30, 38, 41, 66, 70, 71, n71	F_{DL_low}	-	F_{DL_high}	-50	1	
	Bands 48	F_{DL_low}	-	F_{DL_high}	-50	1	2
DC_38_n78	N/A						
DC_39_n78	E-UTRA Band 1, 8, 34, 40, 41, 44, 45 or NR Band n1, n8, n34, n40, n41	F_{DL_low}	-	F_{DL_high}	-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, 34, 40, 41, 44, 45 or NR Band n1, n8, n34, n40, n41	F_{DL_low}	-	F_{DL_high}	-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, 26, 28, 33, 34, 39, 40, 44, 45, 73, 74	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 9, 11, 18, 19, 21	F_{DL_low}	-	F_{DL_high}	-50	1	19
	Frequency range	1884.5		1915.7	-41	0.3	3, 19
DC_41_n78	E-UTRA Band 1, 3, 8, 34, 39, 40, 44, 45 or NR Band n1, n8, n34, n40	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	F_{DL_low}	-	F_{DL_high}	-5	100	
DC_(n)41AA	E-UTRA Band 1, 2, 3, 4, 5, 8, 10, 12, 13 , 14, 17, 24, 25, 26, 27, 28, 29, 30, 34, 39, 40, 42, 44, 45, 48, 50, 51, 65, 66, 70, 71, 73, 74	F_{DL_low}	-	FDL_high	-50	1	

	E-UTRA Band 9, 11, 18, 19, 21	F_{DL_low}	-	FDL_high	-50	1	20
	Frequency range	1884.5	-	1915.7	-41	0.3	3, 20
DC_41A_n41A	E-UTRA Band 1, 2, 3, 4, 5, 8, 10, 12, 13 , 14, 17, 24, 25, 26, 27, 28, 29, 30, 34, 39, 40, 42, 44, 45, 48, 50, 51, 65, 66, 70, 71, 73, 74	F_{DL_low}	-	FDL_high	-50	1	
	E-UTRA Band 9, 11, 18, 19, 21	F_{DL_low}	-	FDL_high	-50	1	20
	Frequency range	1884.5	-	1915.7	-41	0.3	3, 20
DC_41_n79	E-UTRA Band 1, 3, 5, 8, 9, 11, 18, 19, 21, 28, 34, 40, 42, 44, 45, 65 or NR Band n1, n3, n8, n28, n34, n40	F_{DL_low}	-	F_{DL_high}	-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_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 1, 2, 4, 5, 6, 7, 10, 12, 13, 14, 17, 23, 24, 26, 27, 28, 29, 32, 38, 40, 44, 46, 65, 66, 67, 68, 70, 71	F_{DL_low}	-	F_{DL_high}	-50	1	2
DC_42_n77	N/A						
DC_42_n78	N/						
DC_42_n79	N/A						
DC_66_n5	Bands 1, 2, 3, 4, 5, 6, 7, 8, 10, 12, 13, 14, 17, 24, 25, 28, 29, 30, 34, 38, 40, 43, 45, 50, 51, 65, 66, 70, 71, n71, 85	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 26	859	-	869	-27	1	
	Bands 41, 42, 48, 52	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 18, 19	F_{DL_low}	-	F_{DL_high}	-40	1	
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	3
DC_66_n71	E-UTRA Band 4, 5, 7,10, 13, 14, 17, 22, 24, 26, 27, 29, 30, 43, 50, 51, 66, 74	F_{DL_low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 2, 25, 41, 42, 48, 70	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 71	F_{DL_low}	-	F_{DL_high}	-50	1	5
DC_66_n78, DC_66_n86_ULSUP-TDM_n78, DC_66_n86_ULSUP-FDM_n78	E-UTRA Band 1, 3, 5, 7, 8, 20, 26, 28, 34, 39, 40, 41, 65	F_{DL_low}	-	F_{DL_high}	-50	1	
NOTE 1: FDL_low and FDL_high refer to each E-UTRA frequency band specified in Table 5.2-1 of TS36.121-1[10].							

NOTE 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.5B.3.1.1.5-1 are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd, 3rd, 4th or 5th harmonic spurious emissions. Due to spreading of the harmonic emission the exception is also allowed for the first 1 MHz frequency range immediately outside the harmonic emission on both sides of the harmonic emission. This results in an overall exception interval centred at the harmonic emission of (2MHz + N x L_{CRB} x 180kHz), where N is 2, 3, 4, 5 for the 2nd, 3rd, 4th or 5th harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval.

NOTE 3: Applicable when co-existence with PHS system operating in 1884.5 -1915.7MHz

NOTE 4: Applicable only when the assigned E-UTRA carrier is confined within 824 MHz and 849 MHz for UE category M1, M2 and UE category NB1 and NB2.

NOTE 5: These requirements also apply for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1-1 and Table 6.6.3.1A-1 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: This requirement is applicable for any channel bandwidths within the range 3300 - 3800 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range TBD – 3792.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range TBD - 3790 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to TBD RB.

NOTE 9: Applicable when the assigned E-UTRA 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 -36 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 2nd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 2nd harmonic totally or partially overlaps the measurement bandwidth (MBW).

NOTE 11: 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 3rd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 3rd harmonic totally or partially overlaps the measurement bandwidth (MBW).

NOTE 12: This requirement is applicable only for the following cases: - 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 - 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. - 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 RBstart > 3.

NOTE13: This requirement applies for 5, 10, 15 and 20 MHz E-UTRA channel bandwidth allocated within 1744.9MHz and 1784.9MHz.

NOTE 14: This requirement is applicable for 5 and 10 MHz E-UTRA 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 RBstart > 1 and RBstart<48.

NOTE 15: Applicable when NS_05 in section 6.6.3.3.1 is signalled by the network.

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 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 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 centre frequency is within the range 1892.5 - 1894.5 MHz and for E-UTRA carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1895 - 1903 MHz.

NOTE 19: This requirement applies when the E-UTRA and NR carriers are confined within 2545-2575MHz or 2595-2645MHz and the channel bandwidth is 10 or 20 MHz.

The normative reference for this requirement is TS 38.101-3 [1] subclause 6.5B.3.3.1, Table 6.5B.3.3.1-1.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

6.5B.3.3.2.4 Test description

6.5B.3.3.2.4.1 Initial conditions

Same initial conditions as described in subclause 6.5B.3.1.2.4.1.

6.5B.3.3.2.4.2 Test Procedure

Same test procedure as described in subclause 6.5B.3.1.2.4.2 with the following exceptions:

Instead of Table 6.5B.3.1.2.3-1→ use Table Table 6.5B.3.3.2.3-1.

6.5B.3.3.2.4.3 Message Contents

Message contents are according to TS 38.508-1 [5] subclause 4.6.

6.5B.3.3.2.5 Test Requirement

Test requirements for Spurious Emissions UE Co-existence are the same as the minimum requirements and are not repeated in this section.

6.5B.3.4 Spurious Emissions for Inter-band including FR2

6.5B.3.4.1 General Spurious Emissions for Inter-band including FR2

6.5B.3.4.1.1 Test purpose

Same test purpose as in clause 6.5.3.1.1 in TS 38.521-2 [9] for the NR carrier.

6.5B.3.4.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC.

6.5B.3.4.1.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.3.1.3 in TS 38.521-2 [9] for the NR carrier.

The normative reference for this requirement is TS 38.101-3 [4] subclause 6.5B.3.4.

6.5B.3.4.1.4 Test description

6.4B.3.4.1.4.1 Initial conditions

Same test description as in clause 6.5.3.1.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1. For Initial conditions as in clause 6.5.3.1.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1 The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1 The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5.3.1.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.5.3.1.4.1 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.5B.3.4.1.5 Test requirement

Same test requirement as in clause 6.5.3.1.5 in TS 38.521-2 [9] for the NR carrier.

6.5B.3.4.2 Spurious emission band UE co-existence for Inter-band including FR2

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- The referred test case 6.5.3.2 in TS 38.521-2 is incomplete.
- Testability issue for 6GHz ~ [12.75GHz] is identified. How to treat this frequency range is TBD.
- TRP Measurement uncertainty is TBD

6.5B.3.4.2.1 Test purpose

Same test purpose as in clause 6.5.3.2.1 in TS 38.521-2 [9] for the *NR* carrier.

6.5B.3.4.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2.

6.5B.3.4.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5.3.2.3 in TS 38.521-2 [9] for the *NR* carrier.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this requirement is TS 38.101-3 subclause 6.5B.3.4.1.

6.5B.3.4.2.4 Test description

Same Test description as in clause 6.5.3.2.4 in TS 38.521-2 [9] for the *NR* carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.7-1.

For initial conditions as in clause 6.5.3.2.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1 The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1 The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS36.521-1 [10].

Step 6 of Initial conditions as in clause 6.5.3.2.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.5.3.2.4.1 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

6.5B.3.4.2.5 Test requirement

Same Test requirement as in clause 6.5.3.2.5 in TS 38.521-2 [9] for the *NR* carrier.

6.5B.4 Additional Spurious Emissions for EN-DC

6.5B.4.1 Additional Spurious Emissions for Intra-band contiguous EN-DC

6.5B.4.1.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to other channels or other systems in terms of transmitter spurious emissions under the deployment scenarios where additional requirements are specified.

6.5B.4.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward supporting intra-band contiguous EN-DC.

6.5B.4.1.3 Minimum conformance requirements

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.4.1.3.1 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. 1.3.1-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1-1 of TS 38.521-1 [8] from the edge of the channel bandwidth.

Table 6.5B.4.1.3.1-1: Additional requirements

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

The normative reference for this requirement is TS 38.101-3 [4] subclause 6.5B.4.1.1.

Exception requirements are applicable for NR but not for E-UTRA within this test. LTE anchor agnostic approach is not applied. E-UTRA configuration is included but E-UTRA measurements are not performed.

6.5B.4.1.4 Test description

6.5B.4.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and sub-carrier spacing based on NR operating bands specified in table 5.2B.2.1-1. All of these configurations shall be tested with applicable test parameters for each combination of test channel bandwidth and sub-carrier spacing are shown in Table 6.5B.4.1.4.1-1 for E-UTRA and Table 6.5B.4.1.4.1-2 for NR. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex TS 36.521-1 [10] Annex C and in TS 38.521-1 Annex C2 for LTE link and NR link respectively.

Table 6.5B.4.1.4.1-1: E-UTRA test configuration table for NS_04

Initial Conditions

Test Environment as specified in TS 38.508-1 [6] subclause 4.1		NC			
Test Frequencies as specified in TS 38.508-1 [6] subclause 4.3.1		Low range, High range			
Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1		Lowest and Highest N_{RB_agg} (Note 3)			
Test SCS for the NR cell as specified in TS 38.521-1 [8] Table 5.3.5-1		Lowest SCS per Channel Bandwidth			
Test Parameters					
Test ID	**Downlink Configuration**	**EN-DC Uplink Configuration**			
		E-UTRA Cell		**NR Cell**	
		Modulation	**RB allocation (NOTE 2)**	**Modulation**	**RB allocation (NOTE 1)**
1	N/A for Spurious emission.	QPSK	Outer_Full	CP-OFDM QPSK	Edge_1RB_Left
2		QPSK	Outer_Full	CP-OFDM QPSK	Edge_1RB_Right
3		QPSK	Outer_Full	CP-OFDM QPSK	Inner Full
4		QPSK	Outer_Full	CP-OFDM QPSK	Outer Full
Note 1: The specific configuration of each RB allocation is defined in Table 6.1-1 in TS 38.521-1 [8]. Note 2: Outer_Full defined as the transmission bandwidth configuration N_{RB} per channel bandwidth for the E-UTRA component as indicated in TS 36.521-1 [10] Table 5.4.2-1. Note 3: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same aggregated channel BW, only the combination with the highest NR BW is tested.					

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [6] Annex A, Figure A.3.1.1.1 for SS diagram and section A.3.2.1 for UE diagram.

2. The parameter settings for NR cell are set up according to TS 38.508-1 [6] subclause 4.4.3.

3. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

4. E-UTRA downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0 of TS 36.521-1 [10].

5. NR downlink signals are initially set up according to Annex C.0, C.1 and C.2, and uplink signals according to Annex G.0, G.1, G.2, G.3.0 of TS 38.521-1 [8].

6. The UL Reference Measurement channels are set according to Table 6.5B.4.1.4.1-1.

7. NR propagation conditions are set according to B.0 of TS38.521-1[8]. E-UTRA propagation conditions are set according to B.0 of TS36.521-1[10].

8. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.5B.4.1.4.3.

6.5B.4.1.4.2 Test Procedure

1. E-UTRA SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.5B.4.1.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

2. NR SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format [0_1] for C_RNTI to schedule the UL RMC according to Table 6.5B.4.1.4.1-1. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

3. Send continuously uplink power control "up" commands to the UE for both NR and E-UTRA carriers until the UE transmits at its P_{UMAX} level; allow at least 200 ms starting from the first TPC command in this step for the UE to reach P_{UMAX} level.

3. Measure the mean power of each component carriers for the EN-DC configuration, which shall meet the requirements described in Table 6.2B.3.1.5.1 thru 6.5B.2.1.2.5.2 depending NS-values. The period of the measurement shall be at least the continuous duration of one sub-frame.

4. Measure the power of the transmitted signal with a measurement filter of bandwidths according to table 6.5B.4.1.3.1 -1. The centre frequency of the filter shall be stepped in contiguous steps according to the same table. The measured power shall be recorded for each step. The measurement period shall capture the active time slots.

6.5B.4.1.4.3 Message Contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 with the following exceptions for each network signalled value.

6.5B.4.1.4.3.1 Message contents exceptions for network signalled value "NS_04"

1. Information element additionalSpectrumEmission is set to NS_04. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.5B.4.1.4.3.1-1: *SystemInformationBlockType2:* Additional spurious emissions test requirement for "NS_04"

Derivation Path: TS 38.508-1 [5] clause 4.6.3, Table 4.6.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	1 (NS_04)		

6.5B.4.1.5 Test Requirement

Test requirements for additional spurious emissions for intra-band contiguous EN-DC are the same as the minimum requirements described in clause 6.5B.4.1.3 and are not repeated in this section.

6.5B.4.2 Additional Spurious Emissions for Intra-band non-contiguous EN-DC

Editor's note: Wgap for intra-band non-contiguous EN-DC is FFS in TS 38.508-1

6.5B.4.2.1 Test purpose

Same minimum conformance requirements as in clause 6.5B.4.1.1.

6.5B.4.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC.

6.5B.4.2.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5B.4.1.3.

6.5B.4.2.4 Test description

6.5B.4.2.4.1 Initial conditions

Same initial conditions as described in subclause 6.5B.4.1.4.1 for both E-UTRA and NR carriers with the following exception:

1. For each EN-DC combination specified in Table 5.3B.1.3-1, channel spacing between NR and E-UTRA is specified according to subclause 5.4B.1.

2. Set up the NR and E-UTRA test frequencies so that NR carrier is located at the lower frequency side as specified in Table 5.3B.1.3-1. Repeat each testing with E-UTRA carrier frequency is located at the lower side as specified in Table 5.3B.1.3-1.

6.5B.4.2.4.2 Test Procedure

Same test procedure as described in subclause 6.5B.4.1.4.2.

6.5B.4.2.4.3 Message Contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 with the following exceptions for each network signalled value.

6.5B.4.2.4.3.1 Message contents exceptions for network signalled value "NS_04"

1. Information element additionalSpectrumEmission is set to NS_04. This can be set in the *SystemInformationblockType2* as part of the cell broadcast message. This exception indicates that the UE shall meet the additional spurious emission requirement for a specific deployment scenario.

Table 6.5B.4.2.4.3.1-1: *SystemInformationBlockType2: A*dditional spurious emissions test requirement for "NS_04"

Derivation Path: TS 38.508-1 [5] clause 4.6.3, Table 4.6.3-1			
Information Element	**Value/remark**	**Comment**	**Condition**
additionalSpectrumEmission	1 (NS_04)		

6.5B.4.2.5 Test Requirement

Test requirements for Spurious Emissions for intra-band non-contiguous EN-DC are the same as the minimum requirements described in 6.5B.4.2.3 and are not repeated in this section.

6.5B.4.3 Additional Spurious Emissions for Inter-band EN-DC

6.5B.4.3.1 Test purpose

To verify that UE transmitter does not cause unacceptable interference to other channels or other systems in terms of transmitter spurious emissions under the deployment scenarios where additional requirements are specified.

6.5B.4.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward supporting inter-band EN-DC

6.5B.4.3.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 6.5B.4.1.3.

6.5B.4.3.4 Test description

6.5B.4.3.4.1 Initial conditions

Same initial conditions as described in subclause 6.5B.4.1.4.1

6.5B.4.3.4.2 Test Procedure

Same test procedure as described in subclause 6.5B.4.1.4.2.

6.5B.4.3.4.3 Message Contents

Same message contents as described in subclause 6.5B.4.1.4.3.

6.5B.4.3.5 Test Requirement

Test requirements for additional spurious emissions for inter-band EN-DC are the same as the minimum requirements described in 6.5B.4.3.3 and are not repeated in this section.

6.5B.5 Transmit intermodulation

6.5B.5.1 Intra-band contiguous EN-DC

6.5B.5.2 Intra-band non-contiguous EN-DC

6.5B.5.3 Inter-band EN-DC within FR1

6.5B.5.3.1 Test purpose

Same test purpose as in clause 6.5.4 in TS 38.521-1 [8] for the NR carrier.

6.5B.5.3.2 Te

editor's note

Editor's note: wrong section starts here!

6.5B.5.3.3 Minimum conformance requirements

The transmit intermodulation requirement specified in sub-clauses 6.7.1 and 6.7.1A of [5] and sub-clauses 6.5.4 and 6.5A.4 of [2] apply for each component carrier in E-UTRA bands and NR bands, respectively.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

The normative reference for this measurement is TS 38.101-3 [4] clause 6.5B.5.3.

6.5B.5.3.4 Test description

Same test description as in clause 6.5.4.4 in TS 38.521-1 [8] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1. For Initial conditions as in clause 6.5.4.4.1 in TS 38.521-1 [8], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1[10].

Step 6 of Initial conditions as in clause 6.5.4.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG according to TS 38.508 [6] clause 4.5.

Same test procedure as in clause 6.5.4.4.2 in TS 38.521-1 [8].

6.5B.5.3.5 Test Requirement

The ratio derived in step 6 and 8, shall not exceed the described value in Table 6.5.4.5-1 defined in TS 38.521-1 [8].

6.5B.5.4 Inter-band EN-DC including FR2

6.5B.5.5 Inter-band EN-DC including both FR1 and FR2

7 Receiver characteristics

7.1 General

Editor's Note: Test configurations/environments that require new spherical scan shall be included in test procedure section and identifying such scenarios is currently FFS and owned by RAN5.

For Rx test cases the identified beam peak direction can be stored and reused for a device under test in various configurations/environments for the full duration of device testing as long as beam peak direction is the same.

RX requirements for intra-band contiguous and non-contiguous EN-DC only apply for bands < 2.7GHz.

For intra-band non-contiguous EN-DC, the output power is configured as follows:

- One E-UTRA uplink carrier with the output power set to 4dB Below P_{CMAX_L} and the NR band whose downlink is being tested has its uplink carrier output power set to minimum output power as defined in sub-clause 6.3.1 of [2].
- One NR uplink carrier with the output power set to 4dB Below P_{CMAX_L} and the E-UTRA band whose downlink is being tested has its uplink carrier output power set to minimum output power as defined in sub-clause 6.3.2.1 of [4].

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_{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:

$$Wgap \geq 2\cdot|FInterferer\ (offset)| - BWChannel$$

For the E-UTRA sub-block, the $F_{Interferer\ (offset),}$ for a sub-block with a single component carrier is the interferer frequency offset with respect to carrier as specified in subclause 7.5.1, subclause 7.6.1 and subclause 7.6.3 for the respective requirement in [4] and $BW_{Channel.}$ $F_{Interferer\ (offset)}$ 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 subclause 7.5.1A, 7.6.1A and 7.6.3A in [4].

For the NR sub-block, the $F_{Interferer\ (offset),}$ for a sub-block with a single component carrier is the interferer frequency offset with respect to carrier as specified in subclause 7.5.1, subclause 7.6.1 and subclause 7.6.3 for the respective requirement in [2] and $BW_{Channel.}$

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.

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 LTE 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 [2] and [3].

Unless otherwise stated, the UL and DL reference measurement channels are the same with the configurations specified in [2] and [3].

Unless otherwise stated, requirements for NR receiver written in TS 38.101-1 and TS 38.101-2 apply and are assumed anchor agnostic. Requirements are verified under conditions where anchor resources do not interfere NR operation.

Unless otherwise stated, Channel Bandwidth shall be prioritized in the selecting of test points. Subcarrier spacing shall be selected after Test Channel Bandwidth is selected.

7.2 Diversity characteristics

7.3 Reference sensitivity

7.3A Reference sensitivity for CA without EN-DC

7.3A.1 General

FFS

7.3A.2 Reference sensitivity power level for CA without EN-DC

FFS

7.3A.3 $\Delta R_{IB,c}$ for CA without EN-DC

7.3A.3.1 Reference Sensitivity for Inter-band CA between FR1 and FR2 without EN-DC

FFS

7.3B Reference sensitivity level for DC

7.3B.1 General

For EN-DC, E-UTRA and NR single carrier REFSENS requirements defined in [2], [3] and [4] apply to all downlink bands of EN-DC configurations listed in clause 5.5B, unless sensitivity degradation is allowed in this clause of this specification, section 7.3 in TS 38.101-1 [2] or section 7.3 in TS 36.101 [4]. These exceptions also apply to any higher order combination containing one of the exception combinations listed in the sections above as subset. 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].

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.

7.3B.2 Reference sensitivity for EN-DC

Editor's Note: Final section structure under further analysis and discussion.

7.3B.2.0 Minimum Conformance Requirements of Reference sensitivity for EN-DC

7.3B.2.0.1 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.

For each CG, the reference sensitivity is specified as a maximum allowed degradation MSD of the reference sensitivity level as specified for the applicable carrier bandwidths in accordance with TS 36.101[5] for the E-UTRA CG and TS 38.101-1[2] for the NR CG.

For DC configurations of DC bandwidth class B, the throughput on each of the CGs shall be ≥ 95% of the maximum throughput of the respective reference measurement channels as specified in subclause 7.3.4.1 of TS 36.521-1[10] for E-UTRA carrier and subclause 7.3.2.4.1 of TS 38.521-1[8] for NR carrier, respectively. TBD with parameters specified in Table 7.3B.2.1-1. The maximum allowed degradation MSD of the reference sensitivity level, for the each CG, is specified in Table 7.3B.2.0.1-1

Table 7.3B.2.0.1-1: Reference sensitivity (MSD) for intra-band DC bandwidth class

MSD / DC bandwidth class B							
DC configuration	E-UTRA/NR band	F_C (UL) (MHz)	Channel bandwidth (MHz)	UL allocation (LCRB)	F_C (DL) (MHz)	MSD (dB)	Duplex mode
DC_(n)71AA	71	665.5	5	5 (RB_{end} =24)	619.5	0	FDD
	n71	675.5	15	15 (RB_{start} = 0)	629.5	1.8	
DC_(n)71AA	71	670.5	15	15 (RB_{end} = 74)	624.5	0	
	n71	680.5	5	5 (RB_{start} = 0)	634.5	1.6	
DC_(n)71AA	71	668	10	10 (RB_{end} = 49)	622	0	
	n71	678	10	10 (RB_{start} = 0)	632	1.7	
DC_(n)71AA	71	668	10	10 (RB_{start} = 0)	622	17.2	
	n71	678	10	10 (RB_{end} = 51)	632	29.4	

7.3B.2.0.2 Intra-band non-contiguous EN-DC

For DC_3A_n3A intra-band non-contiguous EN-DC combination, only single switched UL is supported in rel.15, no MSD is required.

7.3B.2.0.3 Inter-band EN-DC within FR1

Reference sensitivity exceptions are specified for the condition when there is uplink transmission only in the aggressor band.

Editor's note: FFS how to clarify the issues of 1Tx may also exist for 2Tx mode, for example harmonic, etc.

7.3B.2.0.3.1 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 DC configuration. Reference sensitivity exceptions are specified in Table 7.3B.2.0.3.1-1 with uplink configuration specified in Table 7.3B.2.0.3.1-2.

Table 7.3B.2.0.3.1-1: MSD due to UL harmonic for EN-DC in NR FR1

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[1,2]		23.9	22.1	20.9			17.9	16.8	16.0	14.8	14.3	13.8
	n77[3]		1.1	0.8	0.3			0	0	0	0	0	0
2	n78[1,2]	27.1	23.9	22.1	20.9			17.9					
	n78[3]	1.9	1.1	0.8	0.3								
3	n78[1,2]		23.9	22.1	20.9			17.9	16.8	16.0	14.8	14.3	13.8
	n78[3]		1.1	0.8	0.3			0	0	0	0	0	0
8	n77[6,7] n78[6,7]		10.8	9.1	8			5.1	4.2	3.5	2.3	2.1	1.4
8	n79[4,5]							6.8	6.2	5.6	4.9		4.4
18, 19	n77[4,5]		10.4	8.9	7.8			4.7	3.7	3	1.7		0.7
28	n77[4,5] n78[4,5]		10.4	8.9	7.8			4.7	3.7	3	1.7	1.2	0.7
20	n77[6,7] n78[6,7]		10.8	9.1	8			6					
26	n41	NA	10.3	8.4	7.4			5	4.3	3.9	3.1	2.7	
26	n77[6,7] n78[6,7]		10.8	9.1	8			6					
26	n77[4,5]		10.4	8.9	7.8			4.7	3.7	3	1.7		0.7
n28	1[8,9,10]	10.2	7.6	6.2	5.3								
	n75[1,2]	28.1	25.3	24.0	22.8								
n71	2[11]	4.6	1.0	0.7	0.6								
	2[12]	1.7	1.0	0.7	0.6								
66	n78[1,2]		23.9	22.1	20.9			17.9					
	n78[3]		1.1	0.8	0.3								

NOTE 1: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the aggressor (lower) band for which the 2nd transmitter harmonic is within the downlink transmission bandwidth of a victim (higher) band.

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 with a carrier frequency at $\pm\left(20 + BW_{Channel}^{HB} / 2\right)$ MHz offset from $2 f_{UL}^{LB}$ in the victim (higher band) with $F_{UL\_low}^{LB} + BW_{Channel}^{LB} / 2 \leq f_{UL}^{LB} \leq F_{UL\_high}^{LB} - BW_{Channel}^{LB} / 2$, 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 5th 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 4th 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 a low band for which the 3rd transmitter harmonic is within the downlink transmission bandwidth of a high band.

NOTE 9 The requirements should be verified for UL EARFCN of a low band (superscript LB) such that 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 of a high band in MHz and the channel bandwidth configured in the low band.

NOTE 10: Applicable for the operations with 2 or 4 antenna ports supported in the band with carrier aggregation configured.

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.

Table 7.3B.2.0.3.1-2: 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 high band												
UL band	**DL band**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**	**25 MHz**	**30 MHz**	**40 MHz**	**50 MHz**	**60 MHz**	**80 MHz**	**90 MHz**	**100 MHz**
1	n77		25	36	50			100	100	100	100	100	100
2	n78	12	26	36	50[1] 100[2]								
3	n77		25	36	50			50	50	50	50	50	50
3	n78		25	36	50			50	50	50	50	50	50
8	n77 n78		16	25	25			25	25	25	25	25	25
8	n79							25	25	25	25		25
18	n77	8	16	25	25[1], 25[2]								
19	n77		16	25	25			25	25	25	25		25
20	n77	8	16	25	25[1], 25[2]								
20	n78		12	18	20			20					
26	n77 n78	8	16	25	25[1], 25[2]								
n28	1	8	16	25	25								
n28	n75	12	25	36	50								
28	n77 n78		10	-15	20			25	25	25	25	25	25
66	n78		26	36	50			100					
n71	2	25[4] 8[5]	25[4] 8[5]	20[4] 8[5]	20[4] 8[5]								

NOTE 1: The configuration is used for measurement of MSD for NR channel bandwidth of 20MHz.
NOTE 2: The configuration is used for measurement of MSD for NR channel bandwidth of 40MHz.
NOTE 3: The RB allocation is at the lower edge of the lowest channel of UL band.
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.

7.3B.2.0.3.2 MSD 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 DC configuration. Reference sensitivity exceptions are specified in Table 7.3B.2.0.3.2-1 with uplink configuration specified in Table 7.3B.2.0.3.2-2.

Table 7.3B.2.0.3.2-1: Reference sensitivity exceptions due to receiver harmonic mixing for EN-DC in NR FR1

E-UTRA or NR Band / Channel bandwidth of the affected DL band												
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[4]	26.8	23.6	21.2	15.6							
26	n41[4]	24.3	24.3	22.5	N/A							
41	n77[7]		8.3	8.0	6.9		3.9	3	2.3	1.2		0.4
41	n78[7]		8.3	8.0	6.9		3.9	3	2.3	1.2		0.4
n71	2[5]	4.6	1	0.7	0.6							
	2[6]	1.7	1	0.7	0.6							
n77	41[8]	10.4	10.4	10.4	10.4							N/A
n77	28[2]	28	25	23.2	22							
n78	41[8]	10.4	10.4	10.4	10.4							N/A
n79	19[2]	29.5	26.5	24.7								
n79	21[3]	39.3	36.3	34.5								
n79	26[2]	27	24	22.2								

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 $f_{DL}^{LB} = \lfloor f_{UL}^{HB} / 0.5 \rfloor 0.1$ in MHz and $F_{DL\_low}^{LB} + BW_{Channel}^{LB} / 2 \le f_{DL}^{LB} \le F_{DL\_high}^{LB} - BW_{Channel}^{LB} / 2$ with f_{DL}^{LB} carrier frequency in the victim (lower) band in MHz and the channel bandwidth configured in the lower band.

NOTE 3: The requirements should be verified for DL EARFCN of the victim (lower) band (superscript LB) such that $f_{DL}^{LB} = \lfloor f_{UL}^{HB} / 0.4 \rfloor 0.1$ in MHz and $F_{DL\_low}^{LB} + BW_{Channel}^{LB} / 2 \le f_{DL}^{LB} \le F_{DL\_high}^{LB} - BW_{Channel}^{LB} / 2$ with f_{DL}^{LB} carrier frequency in the victim (lower) band in MHz and the channel bandwidth configured in the lower band.

NOTE 4: The requirements should be verified for UL EARFCN of the aggressor (higher) band (superscript HB) such that $f_{DL}^{LB} = \lfloor f_{UL}^{HB} / 0.3 \rfloor 0.1$ in MHz and $F_{UL\_low}^{LB} + BW_{Channel}^{LB} / 2 \le f_{UL}^{LB} \le F_{UL\_high}^{LB} - BW_{Channel}^{LB} / 2$ with the carrier frequency in the victim (lower) band and the channel bandwidth configured in the higher band.

NOTE 5: These requirements apply when the lower edge frequency of the 5 MHz uplink channel in Band n71 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: These requirements apply when the lower edge frequency of the 10 MHz, 15 MHz, or 20 MHz uplink channel in Band n71 is located at or below 668 MHz and the downlink channel in Band 2 is located with its upper edge at 1990 MHz.

NOTE 7: The requirements should be verified for UL EARFCN of the aggressor (lower) band (superscript LB) such that $f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.15 \rfloor 0.1$ in MHz and $F_{UL\_low}^{LB} + BW_{Channel}^{LB} / 2 \le f_{UL}^{LB} \le F_{UL\_high}^{LB} - BW_{Channel}^{LB} / 2$ with carrier frequency in the victim (higher) band in MHz and the channel bandwidth configured in the lower band.

NOTE 8: The requirements should be verified for UL EARFCN of the aggressor (higher) band (superscript HB) such that $f_{UL}^{LB} = \lfloor 15 * f_{DL}^{HB} \rfloor 0.1$ in MHz and $F_{UL\_low}^{HB} + BW_{Channel}^{HB} / 2 \le f_{UL}^{HB} \le f_{UL\_high}^{HB} - BW_{Channel}^{HB} / 2$ with f_{DL}^{LB} carrier frequency in the victim (lower) band in MHz and $BW_{Channel}^{LB}$ the channel bandwidth configured in the higher band.

Table 7.3B.2.0.3.2-2: 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 band	**DL band**	**SCS of UL band (kHz)**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**	**25 MHz**	**40 MHz**	**50 MHz**	**60 MHz**	**80 MHz**	**90 MHz**	**100 MHz**
2	n71	15	25	50	50	50							
n41	26	15	25	50	75								
41	n77	15	25	25	25	25							
41	n78	15	25	25	25	25							
n77	28	15	25	50	75	100							
n77	41	30	N/A	50	50	50							
n78	41	30	N/A	50	50	50							
n79	19	15	25	50	75								
n79	21	15	25	50	75								
n79	26	15	25	50	75								

NOTE 1: These requirements apply when there is at least one individual RE within the downlink transmission bandwidth of the victim (lower) band for which the 3rd harmonic is within the uplink transmission bandwidth or the uplink adjacent channel's transmission bandwidth of an aggressor (higher) band.

NOTE 2: The requirements should be verified for UL EARFCN of the aggressor (higher) band (superscript HB) such that $f_{DL}^{LB} = \left\lfloor f_{UL}^{HB} / 0.3 \right\rfloor 0.1$ in MHz and $F_{UL\_low}^{LB} + BW_{Channel}^{LB} / 2 \le f_{UL}^{LB} \le F_{UL\_high}^{LB} - BW_{Channel}^{LB} / 2$ with the carrier frequency in the victim (lower) band and the channel bandwidth configured in the higher band.

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 TS36.101 or Table 7.3.2-3 in TS38.101-1.

7.3B.2.0.3.3 Reference sensitivity exceptions due to close proximity of bands for EN-DC in NR FR1

Sensitivity degradation is allowed for a band if it is impacted by close proximity of an UL of another band part of the same DC configuration. Reference sensitivity exceptions are specified in Table 7.3B.2.0.3.3-1 with uplink configuration specified in Table 7.3B.2.0.3.3-2.

Table 7.3B.2.0.3.3-1: Reference sensitivity exceptions due to close proximity of bands for EN-DC in NR FR1

E-UTRA or NR Band / Channel bandwidth of the affected DL band												
UL band	**DL band**	**5 MHz (dBm)**	**10 MHz (dBm)**	**15 MHz (dBm)**	**20 MHz (dBm)**	**25 MHz (dBm)**	**40 MHz (dBm)**	**50 MHz (dBm)**	**60 MHz (dBm)**	**80 MHz (dBm)**	**90 MHz (dBm)**	**100 MHz (dBm)**
X	Y											

Table 7.3B.2.0.3-2: Uplink configuration for reference sensitivity exceptions due to close proximity of bands for EN-DC in NR FR1

E-UTRA or NR Band / SCS / Channel bandwidth of the affected DL band													
UL band	**DL band**	**SCS of UL band (kHz)**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**	**25 MHz**	**40 MHz**	**50 MHz**	**60 MHz**	**80 MHz**	**90 MHz**	**100 MHz**
X	Y												

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 TS36.101 or Table 7.3.2-3 in TS38.101-1.

7.3B.2.0.3.4 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 DC configuration due to cross band isolation issues. Reference sensitivity exceptions are specified in Table 7.3B.2.0.3.4-1 with uplink configuration specified in Table 7.3B.2.0.3.4-2.

Table 7.3B.2.0.3.4-1: Reference sensitivity exceptions due to cross band isolation for EN-DC in NR FR1

E-UTRA or NR Band / Channel bandwidth of the affected DL band												
UL band	DL band	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	25 MHz (dBm)	40 MHz (dBm)	50 MHz (dBm)	60 MHz (dBm)	80 MHz (dBm)	90 MHz (dBm)	100 MHz (dBm)
n77	41[1]	-93.5	-90.5	-88.7	-87.5							
n78	41[1]	-93.5	-90.5	-88.7	-87.5							
NOTE 1: Applicable only when harmonic mixing MSD for this combination is not applied.												

Table 7.3B.2.0.3.4-2: Uplink configuration for reference sensitivity exceptions due to cross band isolation for EN-DC in NR FR1

E-UTRA or NR Band / SCS / Channel bandwidth of the affected DL band													
UL band	DL band	SCS of UL band (kHz)	5 MHz	10 MHz	15 MHz	20 MHz	25 MHz	40 MHz	50 MHz	60 MHz	80 MHz	90 MHz	100 MHz
n77	41	30	270	270	270	270							
n78	41	30	270	270	270	270							
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 TS36.101 or Table 7.3.2-3 in TS38.101-1.													

7.3B.2.0.3.5 Reference sensitivity exceptions 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 case for the EN-DC in NR FR1 configurations the intermodulation products caused by dual uplink operation do not interfere with the 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 in NR FR1 with uplink and downlink assigned to E-UTRA and NR FR1 bands given in Table 7.3B.2.0.3.5.1-1, Table 7.3B.2.0.3.5.2-1 and Table 7.3B.2.0.3.5.3-1 the reference sensitivity is defined only for the specific uplink and downlink test points specified in Table 7.3B.2.0.3.5.1-1, Table 7.3B.2.0.3.5.2-1 and Table 7.3B.2.0.3.5.3-1. For these test points the reference sensitivity levels specified in clause 7.3.1 in [4] and 7.3.2.1 of [2] for the corresponding channel bandwidths or in clause 7.3.1 of [4] are relaxed by the amount of the parameter MSD given in Table 7.3B.2.0.3.5.1-1, Table 7.3B.2.0.3.5.2-1 and Table 7.3B.2.0.3.5.3-1.

The throughput on each of the CGs shall be ≥ 95% of the maximum throughput of the respective reference measurement channels as specified in … with parameters specified in Table 7.3B.2.0.3.5-1 with dual UL transmissions overlapping in time unless otherwise stated.

For EN-DC configurations in Table 7.3B.2.0.3.5-1 with UL/DL channel assignments such that Single UL is allowed, the MSD requirement is verified with non-simultaneous uplink transmissions on the two CGs for UEs only indicating support of Single UL.

7.3B.2.0.3.5.1 Reference sensitivity exceptions for intermodulation interference due to dual uplink operation for EN-DC in NR FR1 involving two bands

Table 7.3B.2.0.3.5.1-1: Reference sensitivity exceptions for PCell due to dual uplink operation for EN-DC in NR FR1 (two bands)

NR or E-UTRA Band / Channel bandwidth / N_{RB} / MSD								
EN-DC Configuration	**EUTRA or NR band**	**UL F_c (MHz)**	**UL/DL BW (MHz)**	**UL L_{CRB}**	**DL F_c (MHz)**	**MSD (dB)**	**Duplex mode**	**IMD order**
DC_1A_n77A	1	1950	5	25	2140	29.8 32.5[4]	FDD	IMD2[3]
	n77	4090	10	25	4090	N/A	TDD	N/A
DC_1A_n77A	1	1950	5	25	2140	8.0 10.7[4]	FDD	IMD4[3]
	n77	3710	10	25	3710	N/A	TDD	N/A
DC_1A_n78A, DC_1A_SUL_n78A-n84A	1	1950	5	25	2140	8.0 10.7[4]	FDD	IMD4[3]
	n78	3710	10	25	3710	N/A	TDD	
DC_2A_n66A	2	1855	5	25	1935	20	FDD	IMD3
	n66	1775	5	25	2175	N/A	TDD	N/A
DC_2A_n66A	2	1883.3	5	25	1963.3	N/A	FDD	N/A
	n66	1750	5	25	2150	4	TDD	IMD5
DC_2A_n78A	2	1855	5	25	1940	26 28.7[4]	FDD	IMD2[3]
	n78	3795	10	25	3795	N/A	TDD	N/A
DC_2A_n78A	2	1885	5	25	1955	8.0 10.7[4]	FDD	IMD4[3]
	n78	3700	10	25	3700	N/A	TDD	N/A
DC_3A_n7A	3	1730	5	25	1825	N/A	FDD	N/A
	n7	2535	10	50	2655	10.2[5]	FDD	IMD4
DC_3A_n77A DC_3A_n78A	3	1740	5	25	1835	26 28.7[4]	FDD	IMD2[3]
	n77, n78	3575	10	25	3575	N/A	TDD	N/A
DC_3A_n77A DC_3A_n78A	3	1765	5	25	1860	8.0 10.7[4]	FDD	IMD4[3]
	n77, n78	3435	10	25	3435	N/A	TDD	N/A
DC_3A_n78A	3	1712.5	5	25	1807.5	TBD[5]	FDD	IMD2
	n78	3515	10	50	3515	N/A	TDD	N/A
	3	1762.5	5	25	1857.5	N/A	FDD	N/A
	n78	3465	10	50	3465	N/A	TDD	N/A
DC_3A-SUL_n78A-n80A	3	1740	5	25	1835	26 28.7[4]	FDD	IMD2[3]
	n78	3575	10	25	3575	N/A	TDD	N/A
DC_3A_SUL_n78A-n80A	3	1765	5	25	1860	8.0 10.7[4]	FDD	IMD4[3]
	n78	3435	10	25	3435	N/A	TDD	N/A
DC_3C_n78A	3	1740	5	25	1835	26 28.7[5]	FDD	IMD2[4]
	n78	3575	10	25	3575	N/A	TDD	N/A
	n78	3710	10	25	3710	N/A	TDD	N/A
DC_3C_n78A	3	1765	5	25	1860	8.0 10.7[5]	FDD	IMD4[4]
	n78	3435	10	25	3435	N/A	TDD	N/A
DC_5A_n66A	5	838	5	25	883	30	FDD	IMD2[3]
	n66	1721	5	25	2121	N/A		N/A
DC_5A_n78A	5	844	5	25	889	8.3	FDD	IMD4
	n78	3421	10	50	3421	N/A	TDD	N/A
DC_8A_n77A DC_8A_n78A DC_8A-SUL_n78A-n81A	8	897.5	5	25	942.5	8.3	FDD	IMD4
	n77, n78	3635	10	50	3635	N/A	TDD	H4
DC_8A_n79A DC_8A-SUL_n79A-n81A	8	897.5	5	25	942.5	4.8	FDD	IMD5
	n79	4532.5	40	216	4532.5	N/A	TDD	N/A
DC_20A_n8A	20	849.5	5	25	808.5	21	FDD	IMD3

	n8	892.5	5	25	937.5	21	FDD	IMD3
DC_20A_n77A	20	850	5	25	810	11	FDD	IMD4
	n77	3360	10	50	3360	N/A	TDD	N/A
	20	840	5	25	800	6.5	FDD	IMD5
	n77	4160	10	50	4150	N/A	TDD	N/A
DC_20A_n78A, DC_20A-SUL_n78A-n82A	20	850	5	25	810	21.7	FDD	IMD4[4]
	n78	3360	10	50	3360	N/A	TDD	N/A
DC_21A_n79A	21	1457.5	5	25	1505.5	18.4	FDD	IMD3
	n79	4420.5	40	216	4420.5	N/A	TDD	N/A
DC_26A_n41A	26	839	5	25	884	15.6	FDD	IMD3
	n41	2562	10	50	2562	N/A	TDD	N/A
DC_28A_n51A	28	725.5	20	25	765.5	5	FDD	IMD 4, 5
	n51	1429.5	5	25	1429.5	5	TDD	IMD 4, 5
DC_26A_n77A DC_26A_n78A	26	836.5	5	25	881.5	11.1	FDD	IMD4
	n77, n78	3390	10	50	3390	N/A	TDD	N/A
CA_28A_n77A, CA_28A_n78A, DC_28A-SUL_n78A-n83A	28	705.5	5	25	760.5	5.5	FDD	IMD5
	n77, n78	3582.5	10	25	3582.5	N/A	TDD	N/A
DC_66A_n5A	n5	838	5	25	883	30	FDD	IMD2[3]
	66	1721	5	25	2121	N/A		N/A
DC_66A_n71A	66	1750	5	25	2150	5	FDD	IMD4
	n71	675	5	25	629	N/A		N/A

NOTE 1: Both of the transmitters shall be set min(+20 dBm, $P_{CMAX\_L,c}$) as defined in subclause 6.2.5A. In case Single UL is allowed and the UE only indicates support of "Single UL" the output power of the active UL shall be set at $P_{CMAX\_L,c}$ or set to the maximum output power according to the UE power scaling capability.

NOTE 2: RB_{START} = 0

NOTE 3: This band is subject to IMD5 also which MSD is not specified.

NOTE 4: Applicable only if operation with 4 antenna ports is supported in the band with carrier aggregation configured.

NOTE 5: For UEs only indicating support of Single UL, this requirement is verified with non-simultaneous uplink transmissions on the E-UTRA and NR CGs

7.3B.2.0.3.5.2 Reference sensitivity exceptions for intermodulation interference due to dual uplink operation for EN-DC in NR FR1 involving three bands

Table 7.3B.2.0.3.5.2-0: Reference sensitivity exceptions for Pcell due to dual uplink operation for EN-DC in NR FR1 (three bands)

EN-DC Configuration	EUTRA/NR band	UL F_c (MHz)	UL/DL BW (MHz)	UL L_{CRB}	DL F_c (MHz)	MSD (dB)	Duplex mode	IMD order
DC_66A_(n)71AA	66	1750	5	25	2150	5	FDD	IMD4
	n71	678	10	10 (RB_{start} =0)	632	N/A		N/A

Table 7.3B.2.0.3.5.2-1: Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

EN-DC Configuration	EUTRA/NR band	UL F_c (MHz)	UL/DL BW (MHz)	UL L_{CRB}	DL F_c (MHz)	MSD (dB)	Duplex mode	IMD order
DC_1A-3A_n28A	1	1975	5	25	2165	N/A	FDD	N/A
	n28	710.5	5	25	765.5	N/A	FDD	N/A
	3	1723.5	5	25	1818.5	4.0	FDD	IMD5
DC_1A-3A_n28A	3	1780	5	25	1875	N/A	FDD	N/A
	n28	710.5	5	25	765.5	N/A	FDD	N/A
	1	1949	5	25	2139	11.0	FDD	IMD4
DC_1A-7A_n28A	1	1935	5	25	2125	N/A	FDD	N/A
	n28	718	5	25	773	N/A	FDD	N/A
	7	2533	10	50	2653	30.0	FDD	IMD2
DC_1A-3A_n77A	1	1950	5	25	2140	N/A	FDD	N/A
	3	1712.5	5	25	1807.5	31.5		IMD2
	n77	3757.5	10	50	3757.5	N/A	TDD	N/A
	1	1950	5	25	2140	N/A	FDD	N/A
	3	1775	5	25	1870	8.5		IMD4
	n77	3980	10	50	3980	N/A	TDD	N/A
	1	1950	5	25	2140	31.0	FDD	IMD2
	3	1775	5	25	1870	N/A		N/A
	n77	3915	10	50	3915	N/A	TDD	N/A
DC_1A-3A_n78A DC_1A-3C_n78A								
	1	1950	5	25	2140	N/A	FDD	N/A
	3	1712.5	5	25	1807.5	31.2		IMD2 $\|f_{B78}-f_{B1}\|$
	n78	3757.5	10	50	3757.5	N/A	TDD	N/A
	1	1935	5	25	2125	2.8	FDD	IMD5 $\|2*f_{B78}-3*f_{B3}\|$
	3	1775	5	25	1870	N/A		N/A
	n78	3725	10	50	3725	N/A	TDD	N/A
	1	1932	5	25	2122	18.1	FDD	IMD3 $\|f_{B78}-2*f_{B5}\|$
	5	829	5	25	874	N/A	FDD	N/A
	n78	3780	10	50	3780	N/A	TDD	N/A
	1	1975	5	25	2165	N/A	FDD	N/A
	5	840	5	25	885	3.1	FDD	IMD5 $\|2*f_{B78}-3*f_{B1}\|$
	n78	3405	10	50	3405	N/A	TDD	N/A
	1	1977.5	5	25	2167.5	N/A	FDD	N/A
	7	2507.5	5	25	2627.5	9.1	FDD	IMD4 $\|f_{B78}-3*f_{B1}\|$
	n78	3305	10	50	3305	N/A	TDD	N/A
	1	1950	5	25	2140	8.7	FDD	IMD4 $\|2*f_{B78}-2*f_{B7}\|$
	7	2510	10	50	2630	N/A	FDD	N/A
	n78	3310	10	50	3310	N/A	TDD	N/A
DC_1A-3A_n79A	1	1950	5	25	2140	3.6	FDD	IMD5
	3	1750	5	25	1845	N/A		N/A
	n79	4860	40	216	4860	N/A	TDD	N/A
DC_1A-18A_n77A	1	1930	5	25	2120	16.4	FDD	IMD3
	18	825	5	25	870	N/A		N/A
	n77	3770	10	50	3770	N/A	TDD	N/A
DC_1A-18A_n78A	1	1930	5	25	2120	16.4	FDD	IMD3
	18	819	5	25	864	N/A		N/A
	n78	3758	10	50	3758	N/A	TDD	N/A
DC_1A-18A_n79A	1	1935	5	25	2125	N/A	FDD	N/A
	18	822.5	5	25	867.5	18.3	FDD	IMD3
	n79	4782.5	40	216	4782.5	N/A	TDD	N/A
	1	1930	5	25	2120	N/A	FDD	N/A

EN-DC Configuration	EUTRA/NR band	UL F_c (MHz)	UL/DL BW (MHz)	UL L_{CRB}	DL F_c (MHz)	MSD (dB)	Duplex mode	IMD order
	18	820	5	25	865	8.9	FDD	IMD4
	n79	4925	40	216	4925	N/A	TDD	N/A
	1	1935	5	25	2125	8.1	FDD	IMD4
	18	822.5	5	25	867.5	N/A	FDD	N/A
	n79	4782.5	40	216	4782.5	N/A	TDD	N/A
DC_1A-19A_n77A DC_1A-19A_n78A	1	1940	5	25	2130	17.8	FDD	IMD3
	19	832.5	5	25	877.5	N/A		N/A
	n77, n78	3795	10	50	3795	N/A	TDD	N/A
DC_1A-19A_n79A	1	1950	5	25	2140	N/A	FDD	N/A
	19	837.5	5	25	882.5	18.3		IMD3
	n79	4782.5	40	216	4782.5	N/A	TDD	N/A
	1	1950	5	25	2140	8.1	FDD	IMD4
	19	837.5	5	25	882.5	N/A		N/A
	n79	4652.5	40	216	4652.5	N/A	TDD	N/A
DC_1A-20A_n78A	1	1930	5	25	2120	20.3	FDD	IMD3
	20	835	5	25	794	N/A	FDD	N/A
	n78	3790	10	50	3790	N/A	TDD	N/A
DC_1A-20A_n78A	1	1950	5	25	2140	N/A	FDD	N/A
	20	851	5	25	810	3.0	FDD	IMD5
	n78	3330	10	50	3330	N/A	TDD	N/A
DC_1A-21A_n77A DC_1A-21A_n78A	1	1964.6	5	25	2154.6	30.6	FDD	IMD2
	21	1450.4	5	25	1498.4	N/A		N/A
	n77, n78	3605	10	50	3605	N/A	TDD	N/A
	1	1950	5	25	2140	N/A	FDD	N/A
	21	1452	5	25	1500	2.9		IMD5
	n77, n78	3675	10	50	3675	N/A	TDD	N/A
DC_1A-28A_n77A	1	1960	5	25	2150	15.8	FDD	IMD3
	28	740	5	25	795	N/A		N/A
	n77	3630	10	50	3630	N/A	TDD	N/A
DC_1A-28A_n77A	1	1960	5	25	2150	N/A	FDD	N/A
	28	725	5	25	780	4.3		IMD5
	n77	3330	10	50	3330	N/A	TDD	N/A
DC_1A-28A_n78A	1	1960	5	25	2150	15.7	FDD	IMD3
	28	740	5	25	795	N/A		N/A
	n78	3630	10	50	3630	N/A	TDD	N/A
DC_1A-28A_n78A	1	1970	5	25	2160	N/A	FDD	N/A
	28	739	5	25	794	4.2		IMD5
	n78	3352	10	50	3352	N/A	TDD	N/A
DC_1A_n28A-n78A	1	1950	5	25	2140	N/A	FDD	N/A
	n28	733	5	25	788	N/A		N/A
	n78	3416	10	50	3416	15.7	TDD	IMD3
	1	1950	5	25	2140	N/A	FDD	N/A
	n78	3320	10	50	3320	N/A	TDD	N/A
	n28	735	5	25	790	3.3	FDD	IMD5
DC_1A-28A_n79A	1	1930	5	25	2120	N/A	FDD	N/A
	28	733	5	25	788	15.2	FDD	IMD3
	n79	4648	40	216	4648	N/A	TDD	N/A
	1	1925	5	25	2115	N/A	FDD	N/A
	28	740	5	25	795	10.0	FDD	IMD4
	n79	4980	40	216	4980	N/A	TDD	N/A
	1	1977.5	5	25	2167.5	1.2	FDD	IMD4
	28	745.5	5	25	800.5	N/A	FDD	N/A
	n79	4420	40	216	4420	N/A	TDD	N/A
	1	1935	5	25	2125	4.5	FDD	IMD5
	28	718	5	25	773	N/A	FDD	N/A
	n79	4807	40	216	4807	N/A	TDD	N/A
DC_1A-41A_n77A	1	1970	5	25	2160	N/A	FDD	N/A
	n77	3400	10	50	3400		TDD	
	41	2510	5	25	2510	11.0	TDD	IMD4
	1	1930	5	25	2120	N/A	FDD	N/A
	n77	4150	10	50	4150		TDD	
	41	2510	5	25	2510	3.6	TDD	IMD5

EN-DC Configuration	EUTRA/NR band	UL F_c (MHz)	UL/DL BW (MHz)	UL L_{CRB}	DL F_c (MHz)	MSD (dB)	Duplex mode	IMD order
DC_1A-41A_n78A	1	1975	5	25	2165	N/A	FDD	N/A
	41		5	25	2515	12	TDD	IMD4
	n78	3410	10	50	3410	N/A	TDD	N/A
DC_1A-41A_n79A	1	1970	5	25	2160	N/A	FDD	N/A
	n79	4500	40	216	4500		TDD	
	41	2530	5	25	2530	29.4	TDD	IMD2
	1	1922.5	5	25	2112.5	N/A	FDD	N/A
	n79	4980	40	216	4980		TDD	
	41	2687.5	5	25	2687.5	0.0	TDD	IMD5
DC_1A-42A_n79A	1	1977.5	5	25	2167.5	N/A	FDD	N/A
	n79	4420	40	216	4420		TDD	
	42	3490	5	25	3490	4.8	TDD	IMD5
	42	3402.5	5	25	3402.5	N/A	TDD	N/A
	n79	4640	40	216	4640		TDD	
	1	1975	5	25	2165	15.5	FDD	IMD3
	42	3450	5	25	3450	N/A	TDD	N/A
	n79	4520	40	216	4520		TDD	
	1	1950	5	25	2140	9.3	FDD	IMD4
DC_1A_n78A-n79A	1	1950	5	25	2140	N/A	FDD	N/A
	n78	3410	10	50	3410	N/A	TDD	N/A
	n79	4870	40	216	4870	15.9	TDD	IMD3
	1	1950	5	25	2140	N/A	FDD	N/A
	n79	4670	40	216	4670	N/A	TDD	N/A
	n78	3490	10	50	3490	4.6	TDD	IMD5
DC_3A-7A_n28A	3	1712.5	5	25	1807.5	N/A	FDD	N/A
	n28	743	5	25	798	N/A	FDD	N/A
	7	2562	10	50	2682	16.9	FDD	IMD3
	7	2543	10	50	2663	N/A	FDD	N/A
	n28	710.5	5	25	765.5	N/A	FDD	N/A
	3	1737.5	5	25	1832.5	26.0	FDD	IMD2
DC_3C-7C_n78A	3	1725	5	25	1820	17.6	FDD	IMD3 $\|f_{B78}-2*f_{B7}\|$
	7	2565	5	25	2685	N/A	FDD	N/A
	n78	3310	10	50	3310	N/A	TDD	N/A
	3	1725	5	25	1820	8.6	FDD	IMD4 $\|2*f_{B78}-2*f_{B7}\|$
	7	2565	5	25	2685	N/A	FDD	N/A
	n78	3475	10	50	3475	N/A	TDD	N/A
DC_3A-20A_n28A	20	852	5	25	811	N/A	FDD	N/A
	n28	738	5	25	793	N/A	FDD	N/A
	3	1723	5	25	1818	9.4	FDD	IMD4
DC_3A-28A_n77A	3	1712.5	5	25	1807.5	N/A	FDD	N/A
	28	715	5	25	770	15.3	FDD	IMD3
	n77	4195	10	50	4195	N/A	TDD	N/A
	3	1755	5	25	1850	17.0	FDD	IMD3
	28	735	5	25	790	N/A	FDD	N/A
	n77	3320	10	50	3320	N/A	TDD	N/A
	3	1775	5	25	1870	17.3	FDD	IMD3
	28	740	5	25	760	N/A		N/A
	n78	3350	10	25	3350	N/A	TDD	N/A
DC_3A-28A_n79A	3	1770	5	25	1865	N/A	FDD	N/A
	28	725	5	25	780	10.3	FDD	IMD4
	n79	4530	40	216	4530	N/A	TDD	N/A
	3	1775	5	25	1870	5.7	FDD	IMD5
	28	725	5	25	780	N/A	FDD	N/A
	n79	4770	40	216	4770	N/A	TDD	N/A
DC_3A_n28A-n78A	3	1750	5	25	1845	N/A	FDD	N/A
	n28	743	5	25	798	N/A		N/A
	n78	3764	10	50	3764	4.5	TDD	IMD5
DC_3A_n78A-n79A	3	1770	5	25	1865	N/A	FDD	N/A
	n78	3340	10	50	3340	N/A	TDD	N/A

EN-DC Configuration	EUTRA/NR band	UL F_c (MHz)	UL/DL BW (MHz)	UL L_{CRB}	DL F_c (MHz)	MSD (dB)	Duplex mode	IMD order
	n79	4910	40	216	4910	16.3	TDD	IMD3
	3	1770	5	25	1865	N/A	FDD	N/A
	n79	4510	40	216	4510	N/A	TDD	N/A
	n78	3710	10	50	3710	4.2	TDD	IMD5
DC_3A-7A_n78A DC_3C-7A_n78A	3	1725	5	25	1820	17.6	FDD	IMD3 $\|f_{B78}-2*f_{B7}\|$
	7	2565	5	25	2685	N/A	FDD	N/A
	n78	3310	10	50	3310	N/A	TDD	N/A
DC_3A-7A_n78A DC_3C-7A_n78A	3	1725	5	25	1820	8.6	FDD	IMD4 $\|2*f_{B78}-2*f_{B7}\|$
	7	2565	5	25	2685	N/A	FDD	N/A
	n78	3475	10	50	3475	N/A	TDD	N/A
	3	1782.5	5	25	1877.5	0.2	FDD	IMD4
	19	842.5	5	25	887.5	N/A		N/A
	n79	4420	40	216	4420	N/A	TDD	N/A
DC_3A-20A_n78A DC_3C-20A_n78A	3	1725	5	25	1820	17.3	FDD	IMD3 $\|f_{B78}-2*f_{B20}\|$
	20	845	5	25	804	N/A	FDD	N/A
	n78	3510	10	50	3510	N/A	TDD	N/A
DC_3A-21A_n77A DC_3A-21A_n78A	3	1767.5	5	25	1862.5	N/A	FDD	N/A
	21	1459.5	5	25	1507.5	8.8		IMD4
	n77, n78	3795	10	50	3795	N/A	TDD	N/A
DC_3A-21A_n77A	3	1771.6	5	25	1866.6	3.4	FDD	IMD5
	21	1450.4	5	25	1498.4	N/A		N/A
	n77	3935	10	50	3935	N/A	TDD	N/A
DC_3A-21A_n79A	3	1774.2	5	25	1869.2	17.8	FDD	IMD3
	21	1450.4	5	25	1498.4	N/A		N/A
	n79	4770	40	216	4770	N/A	TDD	N/A
	5	844	5	25	889	N/A	FDD	N/A
	7	2525	5	25	2645	30.1	FDD	IMD2 $\|f_{B78}-f_{b5}\|$
	n78	3489	10	50	3489	N/A	TDD	N/A
	5	834	5	25	879	30.2	FDD	IMD2 $\|f_{B78}-f_{B7}\|$
	7	2550	5	25	2670	N/A	FDD	N/A
	n78	3429	10	50	3429	N/A	TDD	N/A
	5	830	5	25	875	3.3	FDD	IMD5 $\|2*f_{B78}-3f_{B7}\|$
	7	2525	5	25	2645	N/A	FDD	N/A
	n78	3350	10	50	3350	N/A	TDD	N/A
DC_5A_41A_n78A	5	860	5	25	885	30.2	FDD	IMD2
	41	2615	5	25	2615	N/A	TDD	N/A
	n78	3500	10	50	3500	N/A	TDD	N/A
	5	856.5	5	25	881.5	3.1	FDD	IMD5
	41	2620.5	5	25	2620.5	N/A	TDD	N/A
	n78	3490	10	50	3490	N/A	TDD	N/A
DC_7A-20A_n28A	20	852	5	25	811	N/A	FDD	N/A
	n28	738	5	25	793	N/A	FDD	N/A
	7	2550	10	50	2670	5.9	FDD	IMD5
DC_7A-20A_n78A	7	2560	5	25	2680	N/A	FDD	N/A
	20	851	5	25	810	30.5	FDD	IMD2 $\|f_{B78}-f_{B7}\|$
	n78	3370	10	50	3370	N/A	TDD	N/A
DC_7A-20A_n78A	7	2560	5	25	2680	N/A	FDD	N/A
	20	851	5	25	810	3.0	FDD	IMD5 $\|2*f_{B78}-3*f_{B7}\|$
	n78	3435	10	50	3435	N/A	TDD	N/A

EN-DC Configuration	EUTRA/NR band	UL F_c (MHz)	UL/DL BW (MHz)	UL L_{CRB}	DL F_c (MHz)	MSD (dB)	Duplex mode	IMD order
DC_7A-20A_n78A	7	2555	5	25	2675	30.8	FDD	IMD2 $\lvert f_{B78}-f_{B20}\rvert$
	20	845	5	25	804	N/A	FDD	N/A
	n78	3520	10	50	3520	N/A	TDD	N/A
DC_7A-28A_n78A	7	2570	5	25	2670	N/A	FDD	N/A
	28	720	5	25	780	8.3		IMD2
	n78	3350	10	50	3421	N/A	TDD	N/A
	7	2570	5	25	2670	N/A	FDD	N/A
	28	720	5	25	790	3.0		IMD5
	n78	3460	10	50	3421	N/A	TDD	N/A
	7	2570	5	25	2650	30.5	FDD	IMD2
	28	740	5	25	768	N/A		N/A
	n78	3390	10	50	3421	N/A	TDD	N/A
DC_7A_n28A-n78A	7	2565	5	25	2685	N/A	FDD	N/A
	n28	745	5	25	800	N/A		N/A
	n78	3310	10	50	3310	29.7	TDD	IMD2
	7	2565	5	25	2685	N/A	FDD	N/A
	n78	3365	10	50	3365	N/A	TDD	N/A
	n28	745	5	25	800	28.8	FDD	IMD2
DC_7A-46A_n78A[6]	7	N/A	N/A	N/A	N/A	N/A	FDD	N/A
	46	N/A	N/A	N/A	N/A	N/A	TDD	IMD2, IMD5
	n78	N/A	N/A	N/A	N/A	N/A	TDD	N/A
DC_18A-28A_n77A	18	820	5	25	865	N/A	FDD	N/A
	28	723	5	25	778	4.4		IMD5
	n77	4058	10	50	4058	N/A	TDD	N/A
DC_18A-28A_n77A	18	820	5	25	865	3.9	FDD	IMD5
	28	723	5	25	778	N/A		N/A
	n77	3757	10	50	3757	N/A	TDD	N/A
DC_18A-28A_n78A	18	819	5	25	864	3.8	FDD	IMD5
	28	723	5	25	778	N/A		N/A
	n78	3756	10	50	3756	N/A	TDD	N/A
DC_19A-21A_n77A DC_19A-21A_n78A	19	837.5	5	25	882.5	18.7	FDD	IMD3
	21	1450.4	5	25	1498.4	N/A		N/A
	n77, n78	3783.3	10	50	3783.3	N/A	TDD	N/A
DC_19A-21A_n77A	19	837.5	5	25	882.5	N/A	FDD	N/A
	21	1454.5	5	25	1502.5	9.0		IMD4
	n77	4015	10	50	4015	N/A	TDD	N/A
DC_19A-21A_n79A	19	837.5	5	25	882.2	N/A	FDD	N/A
	21	1452	5	25	1500	3.8		IMD5
	n79	4850	40	216	4850	N/A	TDD	N/A
DC_21A-28A_n77A	21	1452	5	25	1500	N/A	FDD	N/A
	28	730.5	5	25	785.5	16.9	FDD	IMD3
	n77	3689.5	10	50	3689.5	N/A	TDD	N/A
	21	1450.5	5	25	1498.5	9.9	FDD	IMD4
	28	730.5	5	25	785.5	N/A	FDD	N/A
	n77	3690	10	50	3690	N/A	TDD	N/A
DC_21A-28A_n79A	21	1450	5	25	1498	5.2	FDD	IMD5
	28	730.5	5	25	785.5	N/A	TDD	N/A
	n79	4420	40	216	4420	N/A	TDD	N/A
DC_28A-42A_79A	28	730	5	25	785	N/A	FDD	N/A
	42	3420	5	25	3420	15.3	TDD	IMD3
	n79	4880	40	216	4880	N/A	TDD	N/A
	28	745	5	25	800	16.2	FDD	IMD2
	42	3597.5	5	25	3597.5	N/A	TDD	N/A
	n79	4420	40	216	4420	N/A	TDD	N/A
DC_19A_n78A-n79A	19	835	5	25	880	N/A	FDD	N/A
	n78	3680	10	50	3680	N/A	TDD	N/A
	n79	4515	40	216	4515	29.3	TDD	IMD2
	19	835	5	25	880	N/A	FDD	N/A
	n79	4550	40	216	4550	N/A	TDD	N/A

EN-DC Configuration	EUTRA/NR band	UL F_c (MHz)	UL/DL BW (MHz)	UL L_{CRB}	DL F_c (MHz)	MSD (dB)	Duplex mode	IMD order
	n78	3715	10	50	3715	28.8	TDD	IMD2
DC_20A_n28A-n78A	20	857	5	25	816	N/A	FDD	N/A
	n28	743	5	25	798	N/A	FDD	N/A
	n78	3314	10	50	3314	8.7	TDD	IMD4
	20	837	5	25	796	N/A	FDD	N/A
	n78	3310	10	50	3310	N/A	TDD	N/A
	n28	744	5	25	799	9.4	FDD	IMD4
DC_21A_n78A-n79A	21	1453	5	25	1501	N/A	FDD	N/A
	n78	3420	10	50	3420	N/A	TDD	N/A
	n79	4873	40	216	4873	30.1	TDD	IMD2
	21	1453	5	25	1501	N/A	FDD	N/A
	n79	4940	40	216	4940	N/A	TDD	N/A
	n78	3487	10	50	3487	29.8	TDD	IMD2

7.3B.2.0.3.5.3 MSD exceptions due to Tx leakage issue

Table 7.3B.2.0.3.5.3-1: Void

The normative reference for this requirement is TS 38.101-3 [4] subclause 7.3B.2.

7.3B.2.1 Reference sensitivity for Intra-band Contiguous EN-DC (2 CCs)

7.3B.2.1.1 Test purpose

To verify the ability of UE that support intra-band contiguous EN-DC configurations to receive data with a given average throughput for a specified reference measurement channel, under conditions of low signal level, ideal propagation and no added noise. A UE unable to meet the throughput requirement under these conditions will decrease the effective coverage area.

7.3B.2.1.2 Test applicability

This test applies to all types of NR UE release 15 and forward supporting intra-band EN-DC.

7.3B.2.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.3B.2.0 Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

7.3B.2.1.4 Test description

7.3B.2.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations for NR consist of environmental conditions test frequencies, test channel bandwidths and sub-carrier spacing based on NR operating bands specified in Table 5.3.5-1 of TS 38.521-1[8]. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Table 7.3.2.4.1-1, Table 7.3.2.4.1-2, and Table 7.3.2.4.1-3 of TS 38.521-1[8]. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A2.2 of TS 38.521-1[8]. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2 of TS 38.521-1[8].

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 5.4.2.1-1 of TS 36.521-1[10]. All of these configurations shall be tested with applicable test parameters for each channel bandwidth are shown in tables 7.3.4.1-1 and 7.3.4.1-2 of TS36.521-1[10]. The details of the downlink and uplink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3 of TS36.521-1[10]. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2 of TS36.521-1[10].

The channel bandwidths for E-UTRA and NR component carriers shall follow the values specified in Table 5.3B.1.2-1 for a given EN-DC combination.

Table 7.3B.2.1.4.1-1: Test configurations table for intra-band DC_(n)71AA

Initial Conditions	
Test Environment as specified in TS 38.508-1 [5] subclause 4.1	Normal, TL/VL, TL/VH, TH/VL, TH/VH
NR Test Frequencies as specified in TS 38.508-1 [5] subclause 4.3.1 E-UTRA Test Frequencies as specified in TS 36.508-1 [11] subclause 4.3.1	Low, mid and high range
E-UTRA Test Channel Bandwidths as specified in TS 36.508 [11] subclause 4.3.1	5 MHz
NR Test Channel Bandwidths as specified in TS 38.508-1 [5] subclause 4.3.1	5 MHz, 10 MHz, 15 MHz, 20 MHz
NR Test SCS as specified in Table 5.3.5-1 in TS 38.521-1[8]	Lowest supported SCS

NR/E-UTRA Test Parameters							
Downlink Configuration				**Uplink Configuration**			
NR Modulation	**NR RB allocation**	**E-UTRA Modulation**	**E-UTRA RB allocation**	**NR Modulation**	**NR RB allocation**	**E-UTRA Modulation**	**E-UTRA RB allocation**
CP-OFDM QPSK	Full RB (NOTE 1)	QPSK	Full RB	DFT-s-OFDM QPSK	Specified in Table 7.3B.2.1.4.1-2	QPSK	Specified in Table 7.3B.2.1.4.1-2

Test Point configurations						
Test ID	**E-UTRA/NR band**	**F_C (UL) (MHz) N_{UL}**	**Channel BW (MHz)**	**UL allocation (LCRB)**	**F_C (DL) (MHz) N_{DL}**	**Duplex mode**
1	71	665.5MHz, N_{UL}= 133147	5	5@19	619.5 MHz N_{DL} = 68611	FDD
	n71	675.5 N_{UL}= 135100	15	15@0	629.5 N_{DL} = 125900	
2	71	670.5 N_{UL}= 133197	15	15@59	624.5 N_{DL} = 68661	
	n71	680.5 N_{UL}= 136100	5	5@0	634.5 N_{DL} = 126900	
3	71	668 N_{UL}= 133172	10	10@39	622 N_{DL} = 68636	
	n71	678 N_{UL}= 135600	10	10@0	632 N_{DL} = 126400	
4	71	668 N_{UL}= 133172	10	10@39	622 N_{DL} = 68636	
	n71	678 N_{UL}= 135600	10	10@41 (for CP ??	632 N_{DL} = 126400	

NOTE 1: Full RB allocation shall be used per each SCS and channel BW as specified in Table 7.3.2.4.1-2 of TS 38.521-1[8].
NOTE 2: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.3B.1.2-1.

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.1.1 for TE diagram and section A.3.2.1 for UE diagram.
2. The parameter settings for NR cell are set up according to TS 38.508-1 [5] subclause 4.4.3.
3. The parameter settings for E-URA cell are set up according to TS 36.508 [11] subclause 4.4.3.
4. NR downlink signals are initially set up according to Annex C.0, C.1, C.2, C.3.1, and uplink signals according to Annex G.0, G.1, G.2, and G.3.1 of TS38.521-1 [8].

5. E-UTRA downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0 of TS36.521-1[10].

6. The UL Reference Measurement channels for NR are set according to Table 7.3.2.4.1-1, Table 7.3.2.4.1-2, and Table 7.3.2.4.1-3 of TS38.521-1[8].

7 The UL Reference Measurement channels for E-UTRA are set according to Tables7.3.4.1-1 and 7.3.4.1-2 of TS36.521-1[10].

8. NR propagation conditions are set according to Annex B.0 of TS38.521-1[8].

9. E-UTRA propagation conditions are set according to B.0 of TS36.521-1[10].

10. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters *Connectivity* EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 7.3B.2.1.4.3.

11. The UL Reference Measurement channels configurations for exceptional cases are set according to Table 7.3B.2.1.4.1-1.

7.3B.2.1.4.2 Test procedure

1. NR SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format [0_1] for C_RNTI to schedule the UL RMC according to Table 7.3B.2.3.4.1-1 on both EN-DC component carriers. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

2. E-UTRA SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.6.3.1.4.1-1 of TS36.521-1[10]. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

3. Set the Downlink signal level to the appropriate REFSENS value defined in TS 38.521-1 [TBD], Table 7.3.3-1 for NR band and TS 36.521-1[10] Table 7.3.3-1 for E-UTRA band. Send continuously uplink power control "up" commands in the uplink scheduling information to both carriers to ensure the UE transmits PUMAX level for at least the duration of the Throughput measurement.

4. Measure the average throughput of both NR and E-UTRA for a duration sufficient to achieve statistical significance according to Annex H.2 of TS 38.521-1[8] for NR band, and Annex G.2 of TS36.521-1[10] for EUTRA band.

7.3B.2.1.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 for NR band. Message contents are according to TS 36.508 [7] subclause 4.6 for EUTRA band.

7.3B.2.1.5 Test requirement

For intra-band contiguous EN-DC configurations, The throughput of each CG shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with reference receive power level specified in Tables 7.3.2.5-1 and parameters specified Tables 7.3.2.4.1-1, Tables 7.3.2.4.1-2 and Tables 7.3.2.4.1-3 of TS 38.521-1 for NR band , and reference measurement channels as specified in Annex A.3.2 of TS 36.521-1 [10] with parameters specified in Tables 7.3.5-1 and Table 7.3.5-2 of TS 36.521-1 [10] for E-UTRA band.

The maximum allowed degradation MSD of the reference sensitivity level, as specified for the applicable carrier bandwidths in accordance with [5] for the E-UTRA CG and [2] for the NR CG, is specified in Table 7.3B.2.1.5-1.

Table 7.3B.2.1.5-1: Reference sensitivity (with MSD) for intra-band DC_(n)71AA

Test ID	E-UTRA/ NR band	SCS (kHz)	Fc (UL) (MHz) N_{UL}	Channel BW (MHz)	Fc (DL) (MHz)	Ref sensitivity (dBm)	Duplex mode
1	71	N/A	665.5MHz, N_{UL}= 133147	5	619.5 MHz N_{DL} = 68611	-96.5	FDD
	n71	15	675.5 N_{UL}= 135100	15	629.5 N_{DL} = 125900	-89.8 +TT	
2	71	N/A	670.5 N_{UL}= 133197	15	624.5 N_{DL} = 68661	-91.3	
	n71	15	680.5 N_{UL}= 136100	5	634.5 N_{DL} = 126900	-95.6 +TT	
3	71	N/A	668 N_{UL}= 133172	10	622 N_{DL} = 68636	-93.5	
	n71	15	678 N_{UL}= 135600	10	632 N_{DL} = 126400	-92.3 +TT	
4	71	N/A	668 N_{UL}= 133172	10	622 N_{DL} = 68636	-76.3	
	n71	15	678 N_{UL}= 135600	10	632 N_{DL} = 126400	-64.6 +TT	

Editor's note: the table above will have to be deleted!

EN-DC	E-UTRA/ NR band	SCS (kHz)	Channel BW (MHz)	Ref sensitivity (dBm)	Note	Duplex mode
DC_(n)71AA	71	N/A	5	-97.2		FDD
	n71	15	5	-97.2 +TT		
	71	N/A	5	-97.2		
	n71	15	10	-94.0 +TT		
	B1	N/A	5	-97.2		
	n71	15	15	-91.6 +TT		
	71	N/A	5	-97.2		
	n71	15	20	-86.0 +TT		
	71	N/A	5	-96.5	Note 1	
	n71	15	15	-89.8 +TT		
	71	N/A	15	-91.3	Note 2	
	n71	15	5	-95.6 +TT		
	71	N/A	10	-93.5	Note 3	
	n71	15	10	-92.3 +TT		
	71	N/A	10	-76.3	Note 4	
	n71	15	10	-64.6 +TT		
NOTE 1: For test configuration specified by Table 7.3B.2.1.4.1-2 Test ID 1 NOTE 2: For test configuration specified by Table 7.3B.2.1.4.1-2 Test ID 2 NOTE 3: For test configuration specified by Table 7.3B.2.1.4.1-2 Test ID 3 NOTE 4: For test configuration specified by Table 7.3B.2.1.4.1-2 Test ID 4						

Table 7.3B.2.1.5-2: Test Tolerance (TT) for NR RX sensitivity level

f ≤ 3.0GHz	3.0GHz < f ≤ 6.0 GHz
0.7 dB	1.0 dB

7.3B.2.2 Reference sensitivity for Intra-band non-contiguous EN-DC (2 CCs)

7.3B.2.2.1 Test purpose

Same as in clause 7.3B.2.1.1.

7.3B.2.2.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC.

7.3B.2.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.3B.2.0

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.3B.2.2.4 Test Description

7.3B.2.2.4.1 Initial Condition

Initial conditions are a set of te**st configurations the UE needs to be tested in and the steps for the** SS to take with the UE to reach the correct measurement state.

The initial test configurations for E-UTRA consist of the test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1, with the exception that the E-UTRA channel bandwidth is the lowest supported value in Table 5.3B.1.3-1 for the EN-DC non-contiguous configuration under test.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and sub-carrier spacing based on NR operating bands specified in table 5.2B.2.1-1. All of these configurations shall be tested with applicable test parameters for each combination of test channel bandwidth and sub-carrier spacing are shown in Table 7.3B.2.2.4.1-1 for NR band. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 38.521-1 Annex C2.

Table 7.3B.2.2.4.1-1: Test Configuration Table

Initial Conditions				
Test Environment as specified in TS 38.508-1 [5] subclause 4.1		Normal, TL/VL, TL/VH, TH/VL, TH/VH		
Test Frequencies as specified in TS 38.508-1 [5] subclause4.3.1		Low range, High range		
Test Channel Bandwidths as specified in TS 38.508-1 [5] subclause 4.3.1		Lowest, Highest (NOTE 4)		
Test SCS as specified in Table 5.3.5-1		Lowest supported SCS per test channel BW		
Test Parameters				
Test ID	**Downlink Configuration**		**Uplink Configuration**	
	Modulation	**RB allocation**	**Modulation**	**RB allocation**
1	CP-OFDM QPSK	Full RB (NOTE 1)	DFT-s-OFDM QPSK	REFSENS (NOTE 2)
NOTE 1: Full RB allocation shall be used per each SCS and channel BW as specified in Table 7.3.2.4.1-2. NOTE 2: REFSENS refers to Table 7.3.2.4.1-3 which defines uplink RB configuration and start RB location for each SCS, channel BW and NR band. NOTE 3: Test Channel Bandwidths are checked separately for each NR band, which applicable channel bandwidths are specified in Table 5.3.5-1 of 38.521-1 [8] NOTE 4: Lowest and highest allowed NR channel BW as specified in Table 5.3B.1.3-1				

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.1.1 for TE diagram and section A.3.2.1 for UE diagram.

2. The parameter settings for NR cell are set up according to TS 38.508-1 [6] subclause 4.4.3.

3. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3. E-UTRA downlink signal level, and uplink signal level are set according to Table 4.6-1.

4. NR downlink signals are initially set up according to Annex C.0, C.1, and C.2 and uplink signals according to Annex G.0, G.1, G.2, and G.3.0 of TS38.521-1[8].

5. The NR UL Reference Measurement channels for NR are set according to Table 7.3B.2.2.4.1-1.

6. Set up the NR and E-UTRA test frequencies so that NR carrier is located at the lower frequency side as specified in Table 5.3B.1.3-1. Repeat each testing with E-UTRA carrier frequency is located at the lower side as specified in Table 5.3B.1.3-1. 7

7. NR propagation conditions are set according to Annex B.0 of TS38.521-1[8]. E-UTRA propagation conditions are set according to B.0 of TS36.521-1[10].

8 .Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause7.3B.2.2.4.3 .

9 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.3B.2.2.4.2 Test Procedure

1. NR SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format [0_1] for C_RNTI to schedule the UL RMC according to Table 7.3B.22..4.1-1 Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

2. Set the Downlink signal level to the appropriate REFSENS value defined in TS 38.521-1 [8], Table 7.3.3-1 for NR band and TS 36.521-1[10] Table 7.3.3-1 for E-UTRA band. Send continuously uplink power control "up" commands in the uplink scheduling information to both carriers to ensure the UE transmits PUMAX level for at least the duration of the Throughput measurement.

3. Measure the average throughput on the NR carrier for a duration sufficient to achieve statistical significance according to Annex H.2 of TS 38.521-1[8] for NR band.

7.3B.2.2.4.3 Message Contents

Message contents are according to TS 38.508-1 [6] subclause 4.6.1.

7.3B.2.2.5 Test Requirement

For intra-band non-contiguous EN-DC configurations, the measured throughput on the NR carrier shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A with reference receive power level specified in Table 7.3B.2.2.5-1, and parameters specified Tables 7.3.2.4.1-1, Tables 7.3.2.4.1-2 and Tables 7.3.2.4.1-3 of TS 38.521-1[8] for NR band.

Table 7.3B.2.2.5-1: Reference sensitivity for intra-band Non-contiguous EN-DC

EN-DC	E-UTRA/ NR band	SCS (kHz)	Channel BW (MHz)	Ref sensitivity (dBm)	Duplex mode
DC_3A_n3A	3	N/A	5	-96.3	FDD
	n3	15	5	-97.0 +TT	
	3	N/A	5	-96.3	
	n3	15	10	-93.8 +TT	
	3	N/A	5	-96.3	
	n3	15	15	-92.0 +TT	
	3	N/A	5	-96.3	
	n3	15	20	-90.8 +TT	
	3	N/A	5	-96.3	
	n3	15	25	-89.7 +TT	
	3	N/A	5	-96.3	
	n3	15	30	-88.9 +TT	
DC_41A_n41A	41	N/A	20	-92.0	TDD
	n41	15	40	-88.6 +TT	
	41	N/A	20	-92.0	
	n41	15	50	-87.6 +TT	
	41	N/A	20	-92.0	
	n41	30	60	-86.9 +TT	
	41	N/A	20	-92.0	
	n41	30	80	-85.6 +TT	
	41	N/A	20	-92.0	
	n41	30	100	-84.7 +TT	
Note: NR band Test tolerance (TT) is specified in Table 7.3B.2.2.5-2					

Table 7.3B.2.2.5-2: Test Tolerance (TT) for NR RX sensitivity level

f ≤ 3.0GHz	3.0GHz < f ≤ 6.0 GHz
0.7 dB	1.0 dB

7.3B.2.3 Reference sensitivity for Inter-band EN-DC within FR1

Editor's Note:

- Reference sensitivity exceptions due to UL harmonic interference for EN-DC in NR FR1 is partially completed.

- Reference sensitivity test requirement exceptions due to receiver harmonic mixing for EN-DC in NR FR1 Reference sensitivity is partially completed.

- Reference sensitivity exceptions due to close proximity of bands for EN-DC in NR FR1 is FFS.- Reference sensitivity exceptions due to cross band isolation for EN-DC in NR FR1 is FFS.

- Reference sensitivity for Inter-band EN-DC including FR2 is FFS.

- Test requirement and configuration tables for EN-DC configurations without exception requirements in 38.101-3 are complete.

7.3B.2.3.1 Test purpose

To verify the ability of UE that support inter-band EN-DC with FR1 NR band configurations to receive data with a given average throughput for a specified reference measurement channel, under conditions of low signal level, ideal propagation and no added noise. A UE unable to meet the throughput requirement under these conditions will decrease the effective coverage area.

7.3B.2.3.2 Test applicability

This test applies to all types of NR UE release 15 and forward supporting inter-band EN-DC.

7.3B.2.3.3 Minimum conformance requirements

For inter-band EN-DC configurations, the throughput of each CG shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with reference receive power level specified in Tables 7.3.2.5-1 and parameters specified Tables 7.3.2.4.1-1, Tables 7.3.2.4.1-2 and Tables 7.3.2.4.1-3 of TS 38.521-1[8] for NR band , and reference measurement channels as specified in Annex A.3.2 of TS 36.521-1 [10] with parameters specified in Tables 7.3.5-1 and Table 7.3.5-2 of TS 36.521-1 [10] for E-UTRA band.

The reference sensitivity exceptions are allowed for specific EN-DC configurations given in subclauses 7.3B.2.3.3.1, 7.3B.2.3.3.2, 7.3B.2.3.3.3, 7.3B.2.3.3.4 and 7.3B.2.3.3.5.

Editor's note: FFS how to clarify the issues of 1Tx may also exist for 2Tx mode, for example harmonic, etc.

7.3B.2.3.3.1 Reference sensitivity exceptions due to UL harmonic interference for EN-DC in NR FR1

For UE that supports any of the inter-band EN-DC configurations given in Table 7.3B.2.3.3.1-1 and Table 7.3B.2.3.3.1-2, the reference sensitivity exceptions are allowed when the uplink is active in a lower-frequency band and is within a specified frequency range such that transmitter harmonics fall within the downlink transmission bandwidth assigned in a higher band. Reference sensitivity exceptions are specified in Table 7.3B.2.3.3.1-1 with uplink configuration specified in Table 7.3B.2.3.3.1-2.

Table 7.3B.2.3.3.1-1: MSD due to UL harmonic for EN-DC in NR FR1

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[1,2]		23.9	22.1	20.9			17.9	16.8	16.0	14.8	14.3	13.8
	n77[3]		1.1	0.8	0.3			0	0	0	0	0	0

2	n78[1,2]	27.1	23.9	22.1	20.9			17.9					
	n78[3]	1.9	1.1	0.8	0.3								
3	n78[1,2]		23.9	22.1	20.9			17.9	16.8	16.0	14.8	14.3	13.8
	n78[3]		1.1	0.8	0.3			0	0	0	0	0	0
8	n77[6,7] n78[6,7]		10.8	9.1	8			5.1	4.2	3.5	2.3	2.1	1.4
8	n79[4,5]							6.8	6.2	5.6	4.9		4.4
18, 19	n77[4,5]		10.4	8.9	7.8			4.7	3.7	3	1.7		0.7
28	n77[4,5] n78[4,5]		10.4	8.9	7.8			4.7	3.7	3	1.7	1.2	0.7
20	n77[6,7] n78[6,7]		10.8	9.1	8			6					
26	n41	NA	10.3	8.4	7.4			5	4.3	3.9	3.1	2.7	
26	n77[6,7] n78[6,7]		10.8	9.1	8			6					
26	n77[4,5]		10.4	8.9	7.8			4.7	3.7	3	1.7		0.7
n28	1[8,9,10]	10.2	7.6	6.2	5.3								
	n75[1,2]	28.1	25.3	24.0	22.8								
n71	2[11]	4.6	1.0	0.7	0.6								
	2[12]	1.7	1.0	0.7	0.6								
66	n78[1,2]		23.9	22.1	20.9			17.9					
	n78[3]		1.1	0.8	0.3								

NOTE 1: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the aggressor (lower) band for which the 2nd transmitter harmonic is within the downlink transmission bandwidth of a victim (higher) band.

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 with a carrier frequency at $\pm\left(20 + BW_{Channel}^{HB} / 2\right)$ MHz offset from $2 f_{UL}^{LB}$ in the victim (higher band) with $F_{UL\_low}^{LB} + BW_{Channel}^{LB} / 2 \leq f_{UL}^{LB} \leq F_{UL\_high}^{LB} - BW_{Channel}^{LB} / 2$, where _ and $BW_{Channel}^{HB}$ 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 5th 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 4th 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 a low band for which the 3rd transmitter harmonic is within the downlink transmission bandwidth of a high band.

NOTE 9: The requirements should be verified for UL EARFCN of a low band (superscript LB) such that 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 of a high band in MHz and the channel bandwidth configured in the low band.

NOTE 10: Applicable for the operations with 2 or 4 antenna ports supported in the band with carrier aggregation configured.

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.

Table 7.3B.2.3.3.1-2: 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 high band													
UL band	**DL band**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**	**25 MHz**	**30 MHz**	**40 MHz**	**50 MHz**	**60 MHz**	**80 MHz**	**90 MHz**	**100 MHz**
1	n77		25	36	50			100	100	100	100	100	100
2	n78	12	26	39	53[1] 100[2]								
3	n77		25	36	50			50	50	50	50	50	50
3	n77		25	36	50			50	50	50	50	50	50
8	n77 n78		16	25	25			25	25	25	25	25	25
8	n79							25	25	25	25		25
18	n77	8	16	25	25[1], 25[2]								
19	n77		16	25	25			25	25	25	25		25
20	n77	8	16	25	25[1], 25[2]								
20	n78		12	18	20			20					
26	n77 n78	8	16	25	25[1], 25[2]								
n28	1	8	16	25	25								
n28	n75	12	25	36	50								
28	n77 n78		10	-15	20			25	25	25	25	25	25
66	n78		26	36	50			100					
n71	2	8[3]	8[3]	8[3]	8[3]								

NOTE 1: The configuration is used for measurement of MSD for NR channel bandwidth of 20MHz.
NOTE 2: The configuration is used for measurement of MSD for NR channel bandwidth of 40MHz.
NOTE 3: The RB allocation is at the lower edge of the lowest channel of UL band.
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.

7.3B.2.3.3.2 MSD due to receiver harmonic mixing for EN-DC in NR FR1

For UE that supports any of the inter-band EN-DC configurations given in Table 7.3B.2.3.3.2-1, the reference sensitivity degradation is allowed for a band if it is impacted by receiver harmonic mixing due to another band part of the same DC configuration. Reference sensitivity exceptions are specified in Table 7.3B.2.3.3.2-1 with uplink configuration specified in Table 7.3B.2.3.3.2-2. Table 7.3B.2.3.3.2-1: Reference sensitivity exceptions due to receiver harmonic mixing for EN-DC in NR FR1

E-UTRA or NR Band / Channel bandwidth of the affected DL band												
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[4]	26.8	23.6	21.2	15.6							
26	n41[4]	24.3	24.3	22.5	N/A							
41	n77[7]		8.3	8.0	6.9		3.9	3	2.3	1.2		0.4
41	n78[7]		8.3	8.0	6.9		3.9	3	2.3	1.2		0.4
n71	2[5]	4.6	1	0.7	0.6							
	2[6]	1.7	1	0.7	0.6							
n77	41[8]	10.4	10.4	10.4	10.4							N/A
n77	28[2]	28	25	23.2	22							
n78	41[8]	10.4	10.4	10.4	10.4							N/A
n79	19[2]	29.5	26.5	24.7								
n79	21[3]	39.3	36.3	34.5								
n79	26[2]	27	24	22.2	N/A	N/A	N/A	N/A	N/A	N/A		N/A

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 $f_{DL}^{LB} = \lfloor f_{UL}^{HB} / 0.5 \rfloor 0.1$ in MHz and $F_{DL\_low}^{LB} + BW_{Channel}^{LB} / 2 \le f_{DL}^{LB} \le F_{DL\_high}^{LB} - BW_{Channel}^{LB} / 2$ with f_{DL}^{LB} carrier frequency in the victim (lower) band in MHz and $BW_{Channel}^{LB}$ the channel bandwidth configured in the lower band.

NOTE 3: The requirements should be verified for DL EARFCN of the victim (lower) band (superscript LB) such that $f_{DL}^{LB} = \lfloor f_{UL}^{HB} / 0.4 \rfloor 0.1$ in MHz and $F_{DL\_low}^{LB} + BW_{Channel}^{LB} / 2 \le f_{DL}^{LB} \le F_{DL\_high}^{LB} - BW_{Channel}^{LB} / 2$ with f_{DL}^{LB} carrier frequency in the victim (lower) band in MHz and $BW_{Channel}^{LB}$ the channel bandwidth configured in the lower band.

NOTE 4: The requirements should be verified for UL EARFCN of the aggressor (higher) band (superscript HB) such that $f_{DL}^{LB} = \lfloor f_{UL}^{HB} / 0.3 \rfloor 0.1$ in MHz and $F_{UL\_low}^{LB} + BW_{Channel}^{LB} / 2 \le f_{UL}^{LB} \le F_{UL\_high}^{LB} - BW_{Channel}^{LB} / 2$ with the carrier frequency in the victim (lower) band and the channel bandwidth configured in the higher band.

NOTE 5: These requirements apply when the lower edge frequency of the 5 MHz uplink channel in Band n71 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: These requirements apply when the lower edge frequency of the 10 MHz, 15 MHz, or 20 MHz uplink channel in Band n71 is located at or below 668 MHz and the downlink channel in Band 2 is located with its upper edge at 1990 MHz.

NOTE 7: The requirements should be verified for UL EARFCN of the aggressor (lower) band (superscript LB) such that $f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.15 \rfloor 0.1$ in MHz and $F_{UL\_low}^{LB} + BW_{Channel}^{LB} / 2 \le f_{UL}^{LB} \le F_{UL\_high}^{LB} - BW_{Channel}^{LB} / 2$ with carrier frequency in the victim (higher) band in MHz and the channel bandwidth configured in the lower band.

NOTE 8: The requirements should be verified for UL EARFCN of the aggressor (higher) band (superscript HB) such that $f_{UL}^{LB} = \lfloor 15 * f_{DL}^{HB} \rfloor 0.1$ in MHz and $F_{UL\_low}^{HB} + BW_{Channel}^{HB} / 2 \le f_{UL}^{HB} \le f_{UL\_high}^{HB} - BW_{Channel}^{HB} / 2$ with f_{DL}^{LB} carrier frequency in the victim (lower) band in MHz and $BW_{Channel}^{LB}$ the channel bandwidth configured in the higher band.

Table 7.3B.2.3.3.2-2: 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 band	**DL band**	**SCS** of UL band **(kHz)**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**	**25 MHz**	**40 MHz**	**50 MHz**	**60 MHz**	**80 MHz**	**90 MHz**	**100 MHz**
2	n71	15	25	50	50	50							
n41	26	15	25	50	75								
41	n77	15	25	25	25	25							N/A
41	n78	15	25	25	25	25							N/A
n77	28	15	25	50	75	100							
n77	41	30	N/A	50	50	50							
n78	41	30	N/A	50	50	50							
n79	19	15	25	50	75								
n79	21	15	25	50	75								
n79	26	15	25	50	75								

NOTE 1: These requirements apply when there is at least one individual RE within the downlink transmission bandwidth of the victim (lower) band for which the 3rd harmonic is within the uplink transmission bandwidth or the uplink adjacent channel's transmission bandwidth of an aggressor (higher) band.

NOTE 2: The requirements should be verified for UL EARFCN of the aggressor (higher) band (superscript HB) such that $f_{DL}^{LB} = \lfloor f_{UL}^{HB} / 0.3 \rfloor 0.1$ in MHz and $F_{UL\_low}^{LB} + BW_{Channel}^{LB} / 2 \le f_{UL}^{LB} \le F_{UL\_high}^{LB} - BW_{Channel}^{LB} / 2$ with the carrier frequency in the victim (lower) band and the channel bandwidth configured in the higher band.

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 TS36.101 or Table 7.3.2-3 in TS38.101-1.

7.3B.2.3.3.3 Reference sensitivity exceptions due to close proximity of bands for EN-DC in NR FR1

For UE that supports any of the inter-band EN-DC configurations given in Table 7.3B.2.3.3.3-1, the reference sensitivity degradation is allowed for a band if it is impacted by close proximity of an UL of another band part of the same DC configuration. Reference sensitivity exceptions are specified in Table 7.3B.2.3.3.3-1 with uplink configuration specified in Table 7.3B.2.3.3.3-2.

Table 7.3B.2.3.3.3-1: Reference sensitivity exceptions due to close proximity of bands for EN-DC in NR FR1

E-UTRA or NR Band / Channel bandwidth of the affected DL band											
UL band	**DL band**	**5 MHz (dBm)**	**10 MHz (dBm)**	**15 MHz (dBm)**	**20 MHz (dBm)**	**25 MHz (dBm)**	**40 MHz (dBm)**	**50 MHz (dBm)**	**60 MHz (dBm)**	**80 MHz (dBm)**	**100 MHz (dBm)**
X	Y										

Table 7.3B.2.3.3.3-2: Uplink configuration for reference sensitivity exceptions due to close proximity of bands for EN-DC in NR FR1

E-UTRA or NR Band / SCS / Channel bandwidth of the affected DL band													
UL band	**DL band**	**SCS of UL band (kHz)**	**5 MHz**	**10 MHz**	**15 MHz**	**20 MHz**	**25 MHz**	**40 MHz**	**50 MHz**	**60 MHz**	**80 MHz**	**90 MHz**	**100 MHz**
X	Y												

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 TS36.101 or Table 7.3.2-3 in TS38.101-1.

7.3B.2.3.3.4 Reference sensitivity exceptions due to cross band isolation for EN-DC in NR FR1

For UE that supports any of the inter-band EN-DC configurations given in Table 7.3B.2.3.3.4-1, the reference sensitivity degradation is allowed for a band if it is impacted by UL of another band part of the same DC configuration due to cross band isolation issues. Reference sensitivity exceptions are specified in Table 7.3B.2.3.3.4-1 with uplink configuration specified in Table 7.3B.2.3.3.4-2.

Table 7.3B.2.3.3.4-1: Reference sensitivity exceptions due to cross band isolation for EN-DC in NR FR1

E-UTRA or NR Band / Channel bandwidth of the affected DL band												
UL band	DL band	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	25 MHz (dBm)	40 MHz (dBm)	50 MHz (dBm)	60 MHz (dBm)	80 MHz (dBm)	90 MHz (dBm)	100 MHz (dBm)
n77	41[1]	-93.5	-90.5	-88.7	-87.5							
n78	41[1]	-93.5	-90.5	-88.7	-87.5							
NOTE 1: Applicable only when harmonic mixing MSD for this combination is not applied.												

Table 7.3B.2.3.3.4-2: Uplink configuration for reference sensitivity exceptions due to cross band isolation for EN-DC in NR FR1

E-UTRA or NR Band / SCS / Channel bandwidth of the affected DL band													
UL band	DL band	SCS of UL band (kHz)	5 MHz	10 MHz	15 MHz	20 MHz	25 MHz	40 MHz (dBm)	50 MHz (dBm)	60 MHz (dBm)	80 MHz (dBm)	90 MHz (dBm)	100 MHz (dBm)
n77	41	30	270	270	270	270							
n78	41	30	270	270	270	270							
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 TS36.101 or Table 7.3.2-3 in TS38.101-1.													

7.3B.2.3.3.5 Reference sensitivity exceptions 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 when the operating bands of the configuration are either confined below 1 GHz or confined within the frequency range 1695 MHz – 2690 MHz.

In case for the EN-DC in NR FR1 configurations the intermodulation products caused by dual uplink operation do not interfere with the 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 in NR FR1 with uplink and downlink assigned to E-UTRA and NR FR1 bands given in Table 7.3B.2.3.3.5.1-1, Table 7.3B.2.3.3.5.2-1 and Table 7.3B.2.3.3.5.3-1, the reference sensitivity is defined only for the specific uplink and downlink test points specified in Table 7.3B.2.3.3.5.1.-1. Table 7.3B.2.3.3.5.2-1 and Table 7.3B.2.3.3.5.3-1. For these test points the reference sensitivity levels specified in clause 7.3.5 in TS 36. 521-1[10] and 7.3.2.5 of TS 38. 521-1[8] for the corresponding channel bandwidths are relaxed by the amount of the parameter MSD given in Table 7.3B.2.3.3.5.1-1, Table 7.3B.2.3.3.5.2-1 and Table 7.3B.2.3.3.5.3-1.

The throughput on each of the CGs shall be ≥ 95% of the maximum throughput of the respective reference measurement channels as specified in TS 38.521-1 [8] Annex A3.2 for NR and TS 36.521-1 [10] for EUTRA band with parameters specified in Table 7.3B.2.3.3.5-1 with dual UL transmissions overlapping in time unless otherwise stated.

For EN-DC configurations in Table 7.3B.2.3.3.5-1 with UL/DL channel assignments such that Single UL is allowed, the MSD requirement is verified with non-simultaneous uplink transmissions on the two CGs for UEs only indicating support of Single UL.

7.3B.2.3.3.5.1 Reference sensitivity exceptions for intermodulation interference due to dual uplink operation for EN-DC in NR FR1 involving two bands

Table 7.3B.2.3.3.5.1-1: Reference sensitivity exceptions due to dual uplink operation for EN-DC in NR FR1 (two bands)

NR or E-UTRA Band / Channel bandwidth / N_{RB} / MSD									
EN-DC Configuration	**EUTRA or NR band**	**UL F_c (MHz)**	**UL/DL BW (MHz)**	**UL L_{CRB}**	**DL F_c (MHz)**	**MSD (dB)**	**Duplex mode**	**IMD order**	**Single UL allowed**
DC_1A_n77A	1	1950	5	25	2140	29.8	FDD	IMD2[3]	
						32.5[4]			
	n77	4090	10	25	4090	N/A	TDD	N/A	
DC_1A_n77A	1	1950	5	25	2140	8.0	FDD	IMD4[3]	
						10.7[4]			
	n77	3710	10	25	3710	N/A	TDD	N/A	
DC_1A_n78A, DC_1A_SUL_n78A-n84A	1	1950	5	25	2140	8.0	FDD	IMD4[3]	
						10.7[4]			
	n78	3710	10	25	3710	N/A	TDD		
DC_2A_n66A	2	1855	5	25	1935	20	FDD	IMD3	
	n66	1775	5	25	2175	N/A	TDD	N/A	
DC_2A_n66A	2	1883.3	5	25	1963.3	N/A	FDD	N/A	
	n66	1750	5	25	2150	4	TDD	IMD5	
DC_2A_n78A	2	1855	5	25	1940	26	FDD	IMD2[3]	
						28.7[4]			
	n78	3795	10	25	3795	N/A	TDD	N/A	
DC_2A_n78A	2	1885	5	25	1955	8.0	FDD	IMD4[3]	
						10.7[4]			
	n78	3700	10	25	3700	N/A	TDD	N/A	
DC_3A_n7A	3	1730	5	25	1825	N/A	FDD	N/A	
	n7	2535	10	52	2655	10.2[5]	FDD	IMD4	
DC_3A_n77A DC_3A_n78A	3	1740	5	25	1835	26	FDD	IMD2[3]	
						28.7[4]			
	n77, n78	3575	10	25	3575	N/A	TDD	N/A	
DC_3A_n77A DC_3A_n78A	3	1765	5	25	1860	8.0	FDD	IMD4[3]	
						10.7[4]			
	n77, n78	3435	10	25	3435	N/A	TDD	N/A	
DC_3A_n78A	3	1712.5	5	25	1807.5	TBD[5]	FDD	IMD2	Yes
	n78	3515	10	50	3515	N/A	TDD	N/A	
	3	1762.5	5	25	1857.5	N/A	FDD	N/A	No
	n78	3465	10	50	3465	N/A	TDD	N/A	
DC_3A-SUL_n78A-n80A, DC_66A-SUL_n78A-n86A	3, 66	1740	5	25	1835	26	FDD	IMD2[3]	Yes
						28.7[4]			Yes
	n78	3575	10	25	3575	N/A	TDD	N/A	Yes
DC_3A_SUL_n78A-n80A, DC_66A-SUL_n78A-n86A	3, 66	1765	5	25	1860	8.0	FDD	IMD4[3]	No
						10.7[4]			No
	n78	3435	10	25	3435	N/A	TDD	N/A	No
DC_3C_n78A	3	1740	5	25	1835	26	FDD	IMD2[4]	
						28.7[5]			
	n78	3575	10	25	3575	N/A	TDD	N/A	
	n78	3710	10	25	3710	N/A	TDD	N/A	
DC_3C_n78A	3	1765	5	25	1860	8.0	FDD	IMD4[4]	
						10.7[5]			
	n78	3435	10	25	3435	N/A	TDD	N/A	
DC_5A_n66A	5	838	5	25	883	30	FDD	IMD2[3]	
	n66	1721	5	25	2121	N/A		N/A	
DC_5A_n78A	5	844	5	25	889	8.3	FDD	IMD4	
	n78	3421	10	50	3421	N/A	TDD	N/A	
DC_8A_n77A DC_8A_n78A DC_8A-SUL_n78A-n81A	8	897.5	5	25	942.5	8.3	FDD	IMD4	
	n77, n78	3635	10	50	3635	N/A	TDD	H4	
DC_8A_n79A DC_8A-SUL_n79A-n81A	8	897.5	5	25	942.5	4.8	FDD	IMD5	
	n79	4532.5	40	216	4532.5	N/A	TDD	N/A	
DC_20A_n8A	20	849.5	5	25	808.5	21	FDD	IMD3	Yes
	n8	892.5	5	25	937.5	21	FDD	IMD3	

DC_20A_n77A	20	850	5	25	810	11	FDD	IMD4	
	n77	3360	10	50	3360	N/A	TDD	N/A	
	20	840	5	25	800	6.5	FDD	IMD5	
	n77	4160	10	50	4150	N/A	TDD	N/A	
DC_20A_n78A, DC_20A-SUL_n78A-n82A	20	850	5	25	810	21.7	FDD	IMD4[4]	
	n78	3360	10	50	3360	N/A	TDD	N/A	
DC_21A_n79A	21	1457.5	5	25	1505.5	18.4	FDD	IMD3	
	n79	4420.5	40	216	4420.5	N/A	TDD	N/A	
DC_26A_n41A	26	839	5	25	884	15.6	FDD	IMD3	
	n41	2562	10	50	2562	N/A	TDD	N/A	
DC_28A_n51A	28	725.5	20	25	765.5	5	FDD	IMD 4, 5	Yes
	n51	1429.5	5	25	1429.5	5	TDD	IMD 4, 5	
DC_26A_n77A DC_26A_n78A	26	836.5	5	25	881.5	11.1	FDD	IMD4	
	n77, n78	3390	10	50	3390	N/A	TDD	N/A	
CA_28A_n77A, CA_28A_n78A, DC_28A-SUL_n78A-n83A	28	705.5	5	25	760.5	5.5	FDD	IMD5	
	n77, n78	3582.5	10	25	3582.5	N/A	TDD	N/A	
DC_66A_n5A	n5	838	5	25	883	30	FDD	IMD2[3]	
	66	1721	5	25	2121	N/A		N/A	
DC_66A_n71A	66	1750	5	25	2150	5	FDD	IMD4	
	n71	675	5	25	629	N/A		N/A	

NOTE 1: Both of the transmitters shall be set min(+20 dBm, $P_{CMAX\_L,c}$) as defined in subclause 6.2.5A. In case Single UL is allowed and the UE only indicates support of "Single UL" the output power of the active UL shall be set at $P_{CMAX\_L,c}$ or set to the maximum output power according to the UE power scaling capability.
NOTE 2: RB_{START} = 0
NOTE 3: This band is subject to IMD5 also which MSD is not specified.
NOTE 4: Applicable only if operation with 4 antenna ports is supported in the band with carrier aggregation configured.
NOTE 5: For UEs only indicating support of Single UL, this requirement is verified with non-simultaneous uplink transmissions on the E-UTRA and NR CGs

7.3B.2.3.3.5.2 Reference sensitivity exceptions for intermodulation interference due to dual uplink operation for EN-DC in NR FR1 involving three bands

Table 7.3B.2.3.3.5.2-0: Reference sensitivity exceptions for Pcell due to dual uplink operation for EN-DC in NR FR1 (three bands)

EN-DC Configuration	EUTRA/NR band	UL F_c (MHz)	UL/DL BW (MHz)	UL L_{CRB}	DL F_c (MHz)	MSD (dB)	Duplex mode	IMD order
DC_66A_(n)71AA	66	1750	5	25	2150	5	FDD	IMD4
	n71	678	10	10 (RB_{start} =0)	632	N/A		N/A

Table 7.3B.2.3.3.5.2-1: Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

NR or E-UTRA Band / Channel bandwidth / N_{RB} / MSD									
EN-DC Configuration	**EUTRA/NR band**	**UL F_c (MHz)**	**UL/DL BW (MHz)**	**UL L_{CRB}**	**DL F_c (MHz)**	**MSD (dB)**	**Duplex mode**	**IMD order**	**Single UL allowed**
DC_1A-3A_n28A	1	1975	5	25	2165	N/A	FDD	N/A	
	n28	710.5	5	25	765.5	N/A	FDD	N/A	
	3	1723.5	5	25	1818.5	4.0	FDD	IMD5	
DC_1A-3A_n28A	3	1780	5	25	1875	N/A	FDD	N/A	
	n28	710.5	5	25	765.5	N/A	FDD	N/A	
	1	1949	5	25	2139	11.0	FDD	IMD4	
DC_1A-7A_n28A	1	1935	5	25	2125	N/A	FDD	N/A	
	n28	718	5	25	773	N/A	FDD	N/A	
	7	2533	10	50	2653	30.0	FDD	IMD2	
DC_1A-3A_n77A	1	1950	5	25	2140	N/A	FDD	N/A	
	3	1712.5	5	25	1807.5	31.5		IMD2	
	n77	3757.5	10	50	3757.5	N/A	TDD	N/A	
	1	1950	5	25	2140	N/A	FDD	N/A	
	3	1775	5	25	1870	8.5		IMD4	
	n77	3980	10	50	3980	N/A	TDD	N/A	
	1	1950	5	25	2140	31.0	FDD	IMD2	
	3	1775	5	25	1870	N/A		N/A	
	n77	3915	10	50	3915	N/A	TDD	N/A	
DC_1A-3A_n78A DC_1A-3C_n78A									
				50					
	1	1950	5	25	2140	N/A	FDD	N/A	
	3	1712.5	5	25	1807.5	31.2		IMD2 $\|f_{B78}-f_{B1}\|$	
	n78	3757.5	10	50	3757.5	N/A	TDD	N/A	
	1	1935	5	25	2125	2.8	FDD	IMD5 $\|2*f_{B78}-3*f_{B3}\|$	
	3	1775	5	25	1870	N/A		N/A	
	n78	3725	10	50	3725	N/A	TDD	N/A	
DC_1A-5A_n78A									
				50					
				50					
	1	1932	5	25	2122	18.1	FDD	IMD3 $\|f_{B78}-2*f_{B5}\|$	
	5	829	5	25	874	N/A	FDD	N/A	
	n78	3780	10	50	3780	N/A	TDD	N/A	
	1	1975	5	25	2165	N/A	FDD	N/A	
	5	840	5	25	885	3.1	FDD	IMD5 $\|2*f_{B78}-3*f_{B1}\|$	
	n78	3405	10	50	3405	N/A	TDD	N/A	
DC_1A-7A_n78A									
				50					
	1	1977.5	5	25	2167.5	N/A	FDD	N/A	
	7	2507.5	5	25	2627.5	9.1	FDD	IMD4 $\|f_{B78}-3*f_{B1}\|$	
	n78	3305	10	50	3305	N/A	TDD	N/A	
	1	1950	5	25	2140	8.7	FDD	IMD4 $\|2*f_{B78}-2*f_{B7}\|$	
	7	2510	10	50	2630	N/A	FDD	N/A	
	n78	3310	10	50	3310	N/A	TDD	N/A	
DC_1A-3A_n79A	1	1950	5	25	2140	3.6	FDD	IMD5	
	3	1750	5	25	1845	N/A		N/A	

NR or E-UTRA Band / Channel bandwidth / N_{RB} / MSD									
EN-DC Configuration	**EUTRA/NR band**	**UL F_c (MHz)**	**UL/DL BW (MHz)**	**UL L_{CRB}**	**DL F_c (MHz)**	**MSD (dB)**	**Duplex mode**	**IMD order**	**Single UL allowed**
	n79	4860	40	216	4860	N/A	TDD	N/A	
DC_1A-18A_n77A	1	1930	5	25	2120	16.4	FDD	IMD3	
	18	825	5	25	870	N/A		N/A	
	n77	3770	10	50	3770	N/A	TDD	N/A	
DC_1A-18A_n78A	1	1930	5	25	2120	16.4	FDD	IMD3	
	18	819	5	25	864	N/A		N/A	
	n78	3758	10	50	3758	N/A	TDD	N/A	
DC_1A-18A_n79A	1	1935	5	25	2125	N/A	FDD	N/A	
	18	822.5	5	25	867.5	18.3	FDD	IMD3	
	n79	4782.5	40	216	4782.5	N/A	TDD	N/A	
	1	1930	5	25	2120	N/A	FDD	N/A	
	18	820	5	25	865	8.9	FDD	IMD4	
	n79	4925	40	216	4925	N/A	TDD	N/A	
	1	1935	5	25	2125	8.1	FDD	IMD4	
	18	822.5	5	25	867.5	N/A	FDD	N/A	
	n79	4782.5	40	216	4782.5	N/A	TDD	N/A	
DC_1A-19A_n77A DC_1A-19A_n78A	1	1940	5	25	2130	17.8	FDD	IMD3	
	19	832.5	5	25	877.5	N/A		N/A	
	n77, n78	3795	10	50	3795	N/A	TDD	N/A	
DC_1A-19A_n79A	1	1950	5	25	2140	N/A	FDD	N/A	
	19	837.5	5	25	882.5	18.3		IMD3	
	n79	4782.5	40	216	4782.5	N/A	TDD	N/A	
	1	1950	5	25	2140	8.1	FDD	IMD4	
	19	837.5	5	25	882.5	N/A		N/A	
	n79	4652.5	40	216	4652.5	N/A	TDD	N/A	
DC_1A-20A_n78A	1	1930	5	25	2120	20.3	FDD	IMD3	
	20	835	5	25	794	N/A	FDD	N/A	
	n78	3790	10	50	3790	N/A	TDD	N/A	
DC_1A-20A_n78A	1	1950	5	25	2140	N/A	FDD	N/A	
	20	851	5	25	810	3.0	FDD	IMD5	
	n78	3330	10	50	3330	N/A	TDD	N/A	
DC_1A-21A_n77A DC_1A-21A_n78A	1	1964.6	5	25	2154.6	30.6	FDD	IMD2	
	21	1450.4	5	25	1498.4	N/A		N/A	
	n77, n78	3605	10	50	3605	N/A	TDD	N/A	
	1	1950	5	25	2140	N/A	FDD	N/A	
	21	1452	5	25	1500	2.9		IMD5	
	n77, n78	3675	10	50	3675	N/A	TDD	N/A	
DC_1A-28A_n77A	1	1960	5	25	2150	15.8	FDD	IMD3	
	28	740	5	25	795	N/A		N/A	
	n77	3630	10	50	3630	N/A	TDD	N/A	
DC_1A-28A_n77A	1	1960	5	25	2150	N/A	FDD	N/A	
	28	725	5	25	780	4.3		IMD5	
	n77	3330	10	50	3330	N/A	TDD	N/A	
DC_1A-28A_n78A	1	1960	5	25	2150	15.7	FDD	IMD3	
	28	740	5	25	795	N/A		N/A	
	n78	3630	10	50	3630	N/A	TDD	N/A	
DC_1A-28A_n78A	1	1970	5	25	2160	N/A	FDD	N/A	
	28	739	5	25	794	4.2		IMD5	
	n78	3352	10	50	3352	N/A	TDD	N/A	
DC_1A_n28A-n78A	1	1950	5	25	2140	N/A	FDD	N/A	
	n28	733	5	25	788	N/A		N/A	
	n78	3416	10	50	3416	15.7	TDD	IMD3	
	1	1950	5	25	2140	N/A	FDD	N/A	
	n78	3320	10	50	3320	N/A	TDD	N/A	
	n28	735	5	25	790	3.3	FDD	IMD5	
DC_1A-28A_n79A	1	1930	5	25	2120	N/A	FDD	N/A	
	28	733	5	25	788	15.2	FDD	IMD3	
	n79	4648	40	216	4648	N/A	TDD	N/A	
	1	1925	5	25	2115	N/A	FDD	N/A	
	28	740	5	25	795	10.0	FDD	IMD4	
	n79	4980	40	216	4980	N/A	TDD	N/A	

NR or E-UTRA Band / Channel bandwidth / N_{RB} / MSD									
EN-DC Configuration	**EUTRA/NR band**	**UL F_c (MHz)**	**UL/DL BW (MHz)**	**UL L_{CRB}**	**DL F_c (MHz)**	**MSD (dB)**	**Duplex mode**	**IMD order**	**Single UL allowed**
	1	1977.5	5	25	2167.5	1.2	FDD	IMD4	
	28	745.5	5	25	800.5	N/A	FDD	N/A	
	n79	4420	40	216	4420	N/A	TDD	N/A	
	1	1935	5	25	2125	4.5	FDD	IMD5	
	28	718	5	25	773	N/A	FDD	N/A	
	n79	4807	40	216	4807	N/A	TDD	N/A	
DC_1A-41A_n77A	1	1970	5	25	2160	N/A	FDD	N/A	
	n77	3400	10	50	3400		TDD		
	41	2510	5	25	2510	11.0	TDD	IMD4	
	1	1930	5	25	2120	N/A	FDD	N/A	
	n77	4150	10	50	4150		TDD		
	41	2510	5	25	2510	3.6	TDD	IMD5	
DC_1A-41A_n78A	1	1975	5	25	2165	N/A	FDD	N/A	
	41		5	25	2515	12	TDD	IMD4	
	n78	3410	10	50	3410	N/A	TDD	N/A	
DC_1A-41A_n79A	1	1970	5	25	2160	N/A	FDD	N/A	
	n79	4500	40	216	4500		TDD		
	41	2530	5	25	2530	29.4	TDD	IMD2	
	1	1922.5	5	25	2112.5	N/A	FDD	N/A	
	n79	4980	40	216	4980		TDD		
	41	2687.5	5	25	2687.5	0.0	TDD	IMD5	
DC_1A-42A_n79A	1	1977.5	5	25	2167.5	N/A	FDD	N/A	
	n79	4420	40	216	4420		TDD		
	42	3490	5	25	3490	4.8	TDD	IMD5	
	42	3402.5	5	25	3402.5	N/A	TDD	N/A	
	n79	4640	40	216	4640		TDD		
	1	1975	5	25	2165	15.5	FDD	IMD3	
	42	3450	5	25	3450	N/A	TDD	N/A	
	n79	4520	40	216	4520		TDD		
	1	1950	5	25	2140	9.3	FDD	IMD4	
DC_1A_n78A-n79A	1	1950	5	25	2140	N/A	FDD	N/A	
	n78	3410	10	50	3410	N/A	TDD	N/A	
	n79	4870	40	216	4870	15.9	TDD	IMD3	
	1	1950	5	25	2140	N/A	FDD	N/A	
	n79	4670	40	216	4670	N/A	TDD	N/A	
	n78	3490	10	50	3490	4.6	TDD	IMD5	
DC_3A-7A_n28A	3	1712.5	5	25	1807.5	N/A	FDD	N/A	
	n28	743	5	25	798	N/A	FDD	N/A	
	7	2562	10	50	2682	16.9	FDD	IMD3	
	7	2543	10	50	2663	N/A	FDD	N/A	
	n28	710.5	5	25	765.5	N/A	FDD	N/A	
	3	1737.5	5	25	1832.5	26.0	FDD	IMD2	
DC_3C-7C_n78A	3	1725	5	25	1820	17.6	FDD	IMD3 $\|f_{B78}-2*f_{B7}\|$	
	7	2565	5	25	2685	N/A	FDD	N/A	
	n78	3310	10	50	3310	N/A	TDD	N/A	
	3	1725	5	25	1820	8.6	FDD	IMD4 $\|2*f_{B78}-2*f_{B7}\|$	
	7	2565	5	25	2685	N/A	FDD	N/A	
	n78	3475	10	50	3475	N/A	TDD	N/A	
DC_3A-20A_n28A	20	852	5	25	811	N/A	FDD	N/A	
	n28	738	5	25	793	N/A	FDD	N/A	
	3	1723	5	25	1818	9.4	FDD	IMD4	
DC_3A-28A_n77A	3	1712.5	5	25	1807.5	N/A	FDD	N/A	
	28	715	5	25	770	15.3	FDD	IMD3	
	n77	4195	10	50	4195	N/A	TDD	N/A	
	3	1755	5	25	1850	17.0	FDD	IMD3	
	28	735	5	25	790	N/A	FDD	N/A	
	n77	3320	10	50	3320	N/A	TDD	N/A	

NR or E-UTRA Band / Channel bandwidth / N_{RB} / MSD									
EN-DC Configuration	**EUTRA/NR band**	**UL F_c (MHz)**	**UL/DL BW (MHz)**	**UL L_{CRB}**	**DL F_c (MHz)**	**MSD (dB)**	**Duplex mode**	**IMD order**	**Single UL allowed**
	3	1775	5	25	1870	17.3	FDD	IMD3	
	28	740	5	25	760	N/A		N/A	
	n78	3350	10	25	3350	N/A	TDD	N/A	
DC_3A-28A_n79A	3	1770	5	25	1865	N/A	FDD	N/A	
	28	725	5	25	780	10.3	FDD	IMD4	
	n79	4530	40	216	4530	N/A	TDD	N/A	
	3	1775	5	25	1870	5.7	FDD	IMD5	
	28	725	5	25	780	N/A	FDD	N/A	
	n79	4770	40	216	4770	N/A	TDD	N/A	
DC_3A_n28A-n78A	3	1750	5	25	1845	N/A	FDD	N/A	
	n28	743	5	25	798	N/A		N/A	
	n78	3764	10	50	3764	4.5	TDD	IMD5	
DC_3A_n78A-n79A	3	1770	5	25	1865	N/A	FDD	N/A	
	n78	3340	10	50	3340	N/A	TDD	N/A	
	n79	4910	40	216	4910	16.3	TDD	IMD3	
	3	1770	5	25	1865	N/A	FDD	N/A	
	n79	4510	40	216	4510	N/A	TDD	N/A	
	n78	3710	10	50	3710	4.2	TDD	IMD5	
DC_3A-7A_n78A DC_3C-7A_n78A	3	1725	5	25	1820	17.6	FDD	IMD3 $\lvert f_{B78}-2*f_{B7}\rvert$	
	7	2565	5	25	2685	N/A	FDD	N/A	
	n78	3310	10	50	3310	N/A	TDD	N/A	
DC_3A-7A_n78A DC_3C-7A_n78A	3	1725	5	25	1820	8.6	FDD	IMD4 $\lvert 2*f_{B78}-2*f_{B7}\rvert$	
	7	2565	5	25	2685	N/A	FDD	N/A	
	n78	3475	10	50	3475	N/A	TDD	N/A	
	3	1782.5	5	25	1877.5	0.2	FDD	IMD4	
	19	842.5	5	25	887.5	N/A		N/A	
	n79	4420	40	216	4420	N/A	TDD	N/A	
DC_3A-20A_n78A DC_3C-20A_n78A	3	1725	5	25	1820	17.3	FDD	IMD3 $\lvert f_{B78}-2*f_{B20}\rvert$	
	20	845	5	25	804	N/A	FDD	N/A	
	n78	3510	10	50	3510	N/A	TDD	N/A	
DC_3A-21A_n77A DC_3A-21A_n78A	3	1767.5	5	25	1862.5	N/A	FDD	N/A	
	21	1459.5	5	25	1507.5	8.8		IMD4	
	n77, n78	3795	10	50	3795	N/A	TDD	N/A	
DC_3A-21A_n77A	3	1771.6	5	25	1866.6	3.4	FDD	IMD5	
	21	1450.4	5	25	1498.4	N/A		N/A	
	n77	3935	10	50	3935	N/A	TDD	N/A	
DC_3A-21A_n79A	3	1774.2	5	25	1869.2	17.8	FDD	IMD3	
	21	1450.4	5	25	1498.4	N/A		N/A	
	n79	4770	40	216	4770	N/A	TDD	N/A	
	5	844	5	25	889	N/A	FDD	N/A	
	7	2525	5	25	2645	30.1	FDD	N/A	
	n78	3489	10	50	3489	N/A	TDD	N/A	
	5	834	5	25	879	30.2	FDD	IMD2 $\lvert f_{B78}-f_{B7}\rvert$	
	7	2550	5	25	2670	N/A	FDD	N/A	
	n78	3429	10	50	3429	N/A	TDD	N/A	
	5	830	5	25	875	3.3	FDD	IMD5 $\lvert 2*f_{B78}-3f_{B7}\rvert$	
	7	2525	5	25	2645	N/A	FDD	N/A	
	n78	3350	10	50	3350	N/A	TDD	N/A	
DC_5A_41A_n78A	5	860	5	25	885	30.2	FDD	IMD2	
	41	2615	5	25	2615	N/A	TDD	N/A	
	n78	3500	10	50	3500	N/A	TDD	N/A	

NR or E-UTRA Band / Channel bandwidth / N_{RB} / MSD									
EN-DC Configuration	EUTRA/NR band	UL F_c (MHz)	UL/DL BW (MHz)	UL L_{CRB}	DL F_c (MHz)	MSD (dB)	Duplex mode	IMD order	Single UL allowed
	5	856.5	5	25	881.5	3.1	FDD	IMD5	
	41	2620.5	5	25	2620.5	N/A	TDD	N/A	
	n78	3490	10	50	3490	N/A	TDD	N/A	
DC_7A-20A_n28A	20	852	5	25	811	N/A	FDD	N/A	
	n28	738	5	25	793	N/A	FDD	N/A	
	7	2550	10	50	2670	5.9	FDD	IMD5	
DC_7A-20A_n78A	7	2560	5	25	2680	N/A	FDD	N/A	
	20	851	5	25	810	30.5	FDD	IMD2 $\lvert f_{B78}-f_{B7}\rvert$	
	n78	3370	10	50	3370	N/A	TDD	N/A	
DC_7A-20A_n78A	7	2560	5	25	2680	N/A	FDD	N/A	
	20	851	5	25	810	3.0	FDD	IMD5 $\lvert 2*f_{B78}-3*f_{B7}\rvert$	
	n78	3435	10	50	3435	N/A	TDD	N/A	
DC_7A-20A_n78A	7	2555	5	25	2675	30.8	FDD	IMD2 $\lvert f_{B78}-f_{B20}\rvert$	
	20	845	5	25	804	N/A	FDD	N/A	
	n78	3520	10	50	3520	N/A	TDD	N/A	
DC_7A-28A_n78A	7	2570	5	25	2670	N/A	FDD	N/A	
	28	720	5	25	780	8.3		IMD2	
	n78	3350	10	50	3421	N/A	TDD	N/A	
	7	2570	5	25	2670	N/A	FDD	N/A	
	28	720	5	25	790	3.0		IMD5	
	n78	3460	10	50	3421	N/A	TDD	N/A	
	7	2570	5	25	2650	30.5	FDD	IMD2	
	28	740	5	25	768	N/A		N/A	
	n78	3390	10	50	3421	N/A	TDD	N/A	
DC_7A_n28A-n78A	7	2565	5	25	2685	N/A	FDD	N/A	
	n28	745	5	25	800	N/A		N/A	
	n78	3310	10	50	3310	29.7	TDD	IMD2	
	7	2565	5	25	2685	N/A	FDD	N/A	
	n78	3365	10	50	3365	N/A	TDD	N/A	
	n28	745	5	25	800	28.8	FDD	IMD2	
DC_7A-46A_n78A[6]	7	N/A	N/A	N/A	N/A	N/A	FDD	N/A	
	46	N/A	N/A	N/A	N/A	N/A	TDD	IMD2, IMD5	
	n78	N/A	N/A	N/A	N/A	N/A	TDD	N/A	
DC_18A-28A_n77A	18	820	5	25	865	N/A	FDD	N/A	
	28	723	5	25	778	4.4		IMD5	
	n77	4058	10	50	4058	N/A	TDD	N/A	
DC_18A-28A_n77A	18	820	5	25	865	3.9	FDD	IMD5	
	28	723	5	25	778	N/A		N/A	
	n77	3757	10	50	3757	N/A	TDD	N/A	
DC_18A-28A_n78A	18	819	5	25	864	3.8	FDD	IMD5	
	28	723	5	25	778	N/A		N/A	
	n78	3756	10	50	3756	N/A	TDD	N/A	
DC_19A-21A_n77A DC_19A-21A_n78A	19	837.5	5	25	882.5	18.7	FDD	IMD3	
	21	1450.4	5	25	1498.4	N/A		N/A	
	n77, n78	3783.3	10	50	3783.3	N/A	TDD	N/A	
DC_19A-21A_n77A	19	837.5	5	25	882.5	N/A	FDD	N/A	
	21	1454.5	5	25	1502.5	9.0		IMD4	
	n77	4015	10	50	4015	N/A	TDD	N/A	
DC_19A-21A_n79A	19	837.5	5	25	882.2	N/A	FDD	N/A	
	21	1452	5	25	1500	3.8		IMD5	
	n79	4850	40	216	4850	N/A	TDD	N/A	
DC_21A-28A_n77A	21	1452	5	25	1500	N/A	FDD	N/A	
	28	730.5	5	25	785.5	16.9	FDD	IMD3	
	n77	3689.5	10	50	3689.5	N/A	TDD	N/A	

NR or E-UTRA Band / Channel bandwidth / N_{RB} / MSD									
EN-DC Configuration	**EUTRA/NR band**	**UL F_c (MHz)**	**UL/DL BW (MHz)**	**UL L_{CRB}**	**DL F_c (MHz)**	**MSD (dB)**	**Duplex mode**	**IMD order**	**Single UL allowed**
	21	1450.5	5	25	1498.5	9.9	FDD	IMD4	
	28	730.5	5	25	785.5	N/A	FDD	N/A	
	n77	3690	10	50	3690	N/A	TDD	N/A	
DC_21A-28A_n79A	21	1450	5	25	1498	5.2	FDD	IMD5	
	28	730.5	5	25	785.5	N/A	TDD	N/A	
	n79	4420	40	216	4420	N/A	TDD	N/A	
DC_28A-42A_n79A	28	730	5	25	785	N/A	FDD	N/A	
	42	3420	5	25	3420	15.3	TDD	IMD3	
	n79	4880	40	216	4880	N/A	TDD	N/A	
	28	745	5	25	800	16.2	FDD	IMD2	
	42	3597.5	5	25	3597.5	N/A	TDD	N/A	
	n79	4420	40	216	4420	N/A	TDD	N/A	
DC_19A_n78A-n79A	19	835	5	25	880	N/A	FDD	N/A	
	n78	3680	10	50	3680	N/A	TDD	N/A	
	n79	4515	40	216	4515	29.3	TDD	IMD2	
	19	835	5	25	880	N/A	FDD	N/A	
	n79	4550	40	216	4550	N/A	TDD	N/A	
	n78	3715	10	50	3715	28.8	TDD	IMD2	
DC_20A_n28A-n78A	20	857	5	25	816	N/A	FDD	N/A	
	n28	743	5	25	798	N/A	FDD	N/A	
	n78	3314	10	50	3314	8.7	TDD	IMD4	
	20	837	5	25	796	N/A	FDD	N/A	
	n78	3310	10	50	3310	N/A	TDD	N/A	
	n28	744	5	25	799	9.4	FDD	IMD4	
DC_21A_n78A-n79A	21	1453	5	25	1501	N/A	FDD	N/A	
	n78	3420	10	50	3420	N/A	TDD	N/A	
	n79	4873	40	216	4873	30.1	TDD	IMD2	
	21	1453	5	25	1501	N/A	FDD	N/A	
	n79	4940	40	216	4940	N/A	TDD	N/A	
	n78	3487	10	50	3487	29.8	TDD	IMD2	

NOTE 1: Both of the transmitters shall be set min (+20 dBm, $P_{CMAX\_L,c}$) as defined in subclause 6.2.5A. In case Single UL is allowed and the UE only indicates support of "Single UL" the output power of the active UL shall be set at $P_{CMAX\_L,c}$ or set to the maximum output power according to the UE power scaling capability.

NOTE 2: RB_{START} = 0

NOTE 3: For UEs only indicating support of Single UL, this requirement is verified with non-simultaneous uplink transmissions on the E-UTRA and NR CGs.

NOTE 4: This band is subject to IMD5 also which MSD is not specified.

NOTE 5: Applicable only if operation with 4 antenna ports is supported in the band with carrier aggregation configured.

NOTE 6: No requirements apply when there is at least one individual RE within the intermodulation generated by the dual uplink is within the downlink transmission bandwidth of the Band 46. The reference sensitivity should only be verified when this is not the case (the requirements for Band 46 specified in the CA_7A-46A in clause 7.3.1 of 36.101 apply).

7.3B.2.3.3.5.3 MSD exceptions due to Tx leakage issue

Table 7.3B.2.3.3.5.3-1: Void

The normative reference for this requirement is TS 38.101-3 [4] subclause 7.3B.2.3.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

7.3B.2.3.4 Test description

7.3B.2.3.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

For each supported inter-band EN-DC combination specified in subclause 5.2B.4.1, the initial test configurations for NR carrier consist of environmental conditions test frequencies, test channel bandwidths and sub-carrier spacing based on NR operating bands specified in Table 5.3.5-1 of TS 38.521-1[8]. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Table 7.3.2.4.1-1, Table 7.3.2.4.1-2, and Table 7.3.2.4.1-3 of TS 38.521-1[8]. The details of the uplink reference measurement channels (RMCs) are specified in Annexe A2.2 of TS 38.521-1[8]. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2 of TS 38.521-1[8].

For each supported inter-band EN-DC combination specified in subclause 5.2B.4.1, the initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 5.4.2.1-1 of TS 36.521-1[10]. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Table 7.3B.2.3.4.1-1. The details of the downlink and uplink reference measurement channels (RMCs) are specified in Annexes A.2 and A.3 of TS36.521-1[10]. The details of the OCNG patterns used are specified in Annex A.5. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2 of TS36.521-1[10].

Table 7.3B.2.3.4.1-1: E-UTRA Test Configuration Table

<table>
<tr><th colspan="7">Initial Conditions</th></tr>
<tr><td colspan="3">Test Environment as specified in
TS 36.508[7] subclause 4.1</td><td colspan="4">NC, TL/VL, TL/VH, TH/VL, TH/VH</td></tr>
<tr><td colspan="3">Test Frequencies as specified in
TS36.508 [7] subclause 4.3.1</td><td colspan="4">Mid range</td></tr>
<tr><td colspan="3">Test Channel Bandwidths as specified in
TS 36.508 [7] subclause 4.3.1</td><td colspan="4">5MHz</td></tr>
<tr><th colspan="7">Test Parameters for Channel Bandwidths</th></tr>
<tr><td></td><th colspan="3">Downlink Configuration</th><th colspan="3">Uplink Configuration</th></tr>
<tr><td>Ch BW</td><td>Mod'n</td><td colspan="2">RB allocation</td><td>Mod'n</td><td colspan="2">RB allocation</td></tr>
<tr><td></td><td></td><td>FDD</td><td>TDD</td><td></td><td>FDD</td><td>TDD</td></tr>
<tr><td>5MHz</td><td>QPSK</td><td>25</td><td>N/A</td><td>QPSK</td><td>25</td><td>25</td></tr>
<tr><td>5MHz</td><td>QPSK</td><td>25</td><td>N/A</td><td>QPSK</td><td>5[3]</td><td>N/A</td></tr>
<tr><td colspan="7">Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.4.2.1-1.
Note 2: For the DL signal one sided dynamic OCNG Pattern OP.1 FDD/TDD is used.
Note 3: Applicable only to E-UTRA FDD Bands 31 and 72. The UL resource blocks shall be located at RBstart 10 (according to Table 7.3.3-2).</td></tr>
</table>

The initial test configurations for E-UTRA band and NR band consist of environmental conditions, test frequencies, and channel bandwidths and RB allocations for exceptional test scenarios are specified in Table 7.3B.2.3.4.1-2 to Table 7.3B.2.3.4.1-7.

Table 7.3B.2.3.4.1-2: Initial test conditions for reference sensitivity exceptions due to UL harmonic interference for EN-DC in NR FR1

Initial Conditions							
Test Environment as specified in TS 38.508-1 [6] subclause 4.1				Normal, TL/VL, TL/VH, TH/VL, TH/VH			
NR Test Frequencies as specified in TS 38.508-1 [6] subclause4.3.1 E-UTRA Test Frequencies as specified in TS 38.508-1 [11] subclause4.3.1				Specified in Table 7.3B.2.3.4.1-2a to Table 7.3B.2.3.4.1-7			
NR Test Channel Bandwidths as specified in TS 38.508-1 [6] subclause 4.3.1				Specified in Table 7.3B.2.3.4.1-2a to Table 7.3B.2.3.4.1-7			
NR Test SCS as specified in Table 5.3.5-1				Lowest supported SCS			
E-UTRA Test Channel Bandwidths as specified in TS 36.508 [11] subclause 4.3.1				Specified in Table 7.3B.2.3.4.1-2a to Table 7.3B.2.3.4.1-7			
NR Test Parameters							
Downlink Configuration				**Uplink Configuration**			
E-UTRA Cell		**NR Cell**		**E-UTRA Cell**		**NR Cell**	
Modulation	**RB allocation**	**Modulation**	**RB allocation**	**Modulation**	**RB allocation**	**Modulation**	**RB allocation**
QPSK	Full RB	CP-OFDM QPSK	Full RB (NOTE 1)	QPSK	Specified in Table 7.3B.2.3.4.1-2a - Table 7.3B.2.3.4.1-6	DFT-s-OFDM QPSK	Specified in Table 7.3B.2.3.4.1-2a - Table 7.3B.2.3.4.1-6
NOTE 1: Full RB allocation shall be used per each SCS and channel BW as specified in Table 7.3.2.4.1-2 of TS 38.521-1[8].							

Table 7.3B.2.3.4.1-2a: Test configurations table for exceptions due to UL harmonic interference for EN-DC 1_n77

E-UTRA Band 1			NR Band 77		
Test ID	**Channel BW (MHz)**	**F_C (UL) (MHz) N_{UL}**	**NR F_C (UL) (MHz) N_{UL}**	**NR CBW**	**UL allocation (LCRB)**
1	10	1925MHz/ 18050	3850MHz/ 656666	5	12@0
				10	25@0
				15	36@0
				20	50@0
				40	100@0
2		1950 MHz/ 18300	3900 MHz/ 660000	5	12@0
				10	25@0
				15	36@0
				20	50@0
				40	100@0
3		1975 MHz/18550	3950 MHz/ 663333	5	12@0
				10	25@0
				15	36@0
				20	50@0
				40	100@0
Note: Test frequencies are selected to fulfil Note 1 and Note 2 in Table 7.3B.2.3.3.1-1.					

Table 7.3B.2.3.4.1-2b: Test configurations table for exceptions due to UL harmonic interference for EN-DC 1_n77 (For Note 3 in Table 7.3B.2.3.3.1-1)

E-UTRA Band 1			NR Band 77		
Test ID	Channel BW (MHz)	F_C (UL) (MHz) N_{UL}	NR F_C (UL) (MHz) N_{UL}	NR CBW	UL allocation (LCRB)
1	10	1925MHz/ 18050	3820 MHz/ 654666	5	12@0
				10	25@0
				15	36@0
				20	50@0
2		1950 MHz/ 18300	3870 MHz/ 658000	5	12@0
				10	25@0
				15	36@0
				20	50@0
3		1975 MHz/18550	3920 MHz/ 651333	5	12@0
				10	25@0
				15	36@0
				20	50@0
Note: Test frequencies are selected to fulfil Note 3 in Table 7.3B.2.3.3.1-1.					

Table 7.3B.2.3.4.1-2c: Test configurations table for exceptions due to UL harmonic interference for EN-DC 3_n77

	E-UTRA Band 3			NR Band 77	
Test ID	Channel BW (MHz)	F_C (UL) (MHz) N_{UL}	NR F_C (UL) (MHz) N_{UL}	NR CBW	UL allocation (LCRB)
1	10	1715 MHz/ 19250	3430 MHz/ 628666	5	12@0
				10	25@0
				15	36@0
				20	50@0
				40	50@0
2		1747.5 MHz/ 19575	3495 MHz/ 633000	5	12@0
				10	25@0
				15	36@0
				20	50@0
				40	50@0
3		1780 MHz/ 19900	3560 MHz/ 637333	5	12@0
				10	25@0
				15	36@0
				20	50@0
				40	50@0
Note: Test frequencies are selected to fulfil Note 1 and Note 2 in Table 7.3B.2.3.3.1-1.					

Table 7.3B.2.3.4.1-2d: Test configurations table for exceptions due to UL harmonic interference for EN-DC 3_n77 (For Note 3 in Table 7.3B.2.3.3.1-1)

	E-UTRA Band 3			NR Band 77	
Test ID	Channel BW (MHz)	F_C (UL) (MHz) N_{UL}	NR F_C (UL) (MHz) N_{UL}	NR CBW	UL allocation (LCRB)
1	10	1715 MHz/ 19250	3400 MHz/ 626666	5	12@0
				10	25@0
				15	36@0
				20	50@0
2		1747.5 MHz/ 19575	3465 MHz/ 631000	5	12@0
				10	25@0
				15	36@0
				20	50@0
3		1780 MHz/ 19900	3590 MHz/ 639333	5	12@0
				10	25@0
				15	36@0
				20	50@0
Note: Test frequencies are selected to fulfil Note 3 in Table 7.3B.2.3.3.1-1.					

Table 7.3B.2.3.4.1-2e: Test configurations table for exceptions due to UL harmonic interference for EN-DC 2_n78

	E-UTRA Band 2			NR Band 78	
Test ID	Channel BW (MHz)	F_C (UL) (MHz) N_{UL}	NR F_C (UL) (MHz) N_{UL}	NR CBW	UL allocation (LCRB)
1	10	1855MHz/ 18650	3710 MHz/ 647333	5	12@0
				10	26@0
				15	39@0
				20	53@0
				40	100@0
2		1880 MHz/ 18900	3760 MHz/ 650666	5	12@0
				10	26@0
				15	39@0
				20	53@0
				40	100@0
3		1890 MHz/ 19000	3780 MHz/ 652000	5	12@0
				10	26@0
				15	39@0
				20	53@0
				40	100@0
Note: Test frequencies are selected to fulfil Note 1and Note 2 in Table 7.3B.2.3.3.1-1.					

Table 7.3B.2.3.4.1-2f: Test configurations table for exceptions due to UL harmonic interference for EN-DC 2_n78 (for Note 3 in Table 7.3B.2.3.3.1-1)

	E-UTRA Band 2			NR Band 78	
Test ID	Channel BW (MHz)	F_C (UL) (MHz) N_{UL}	NR F_C (UL) (MHz) N_{UL}	NR CBW	UL allocation (LCRB)
1	10	1855MHz/ 18650	3680 MHz/ 645333	5	12@0
				10	26@0
				15	39@0
				20	53@0
2		1880 MHz/ 18900	3730 MHz/ 648666	5	12@0
				10	26@0
				15	39@0
				20	53@0
3		1880 MHz/ 18900	3790 MHz/ 652666	5	12@0
				10	26@0
				15	39@0
				20	53@0
Note: Test frequencies are selected to fulfil Note 3 in Table 7.3B.2.3.3.1-1.					

Table 7.3B.2.3.4.1-2g: Test configurations table for exceptions due to UL harmonic interference for EN-DC 3_n78 (Test frequencies are selected to fulfil Requirement for Note 1 and 2 in Table 7.3B.2.3.3.1-1)

	E-UTRA Band 3			NR Band 78	
Test ID	Channel BW (MHz)	F_C (UL) (MHz) N_{UL}	NR F_C (UL) (MHz) N_{UL}	NR CBW	UL allocation (LCRB)
1	10	1715 MHz/ 19250	3430 MHz/ 628666	5	12@0
				10	25@0
				15	36@0
				20	50@0
				40	50@0
2		1747.5 MHz/ 19575	3495 MHz/ 633000	5	12@0
				10	25@0
				15	36@0
				20	50@0
				40	50@0
3		1780 MHz/ 19900	3560 MHz/ 637333	5	12@0
				10	25@0
				15	36@0
				20	50@0
				40	50@0
Note: Test frequencies are selected to fulfil Note 1 and 2 in Table 7.3B.2.3.3.1-1.					

Table 7.3B.2.3.4.1-2h: Test configurations table for exceptions due to UL harmonic interference for EN-DC 3_n78 (Test frequencies are selected to fulfil Requirement for Note 3 inTable 7.3B.2.3.3.1-1)

	E-UTRA Band 3			NR Band 78	
Test ID	**Channel BW (MHz)**	**F_C (UL) (MHz) N_{UL}**	**NR F_C (UL) (MHz) N_{UL}**	**NR CBW**	**UL allocation (LCRB)**
1	10	1715 MHz/ 19250	3400 MHz/ 626666	5	12@0
				10	25@0
				15	36@0
				20	50@0
2		1747.5 MHz/ 19575	3465 MHz/ 631000	5	12@0
				10	25@0
				15	36@0
				20	50@0
3		1780 MHz/ 19900	3590 MHz/ 639333	5	12@0
				10	25@0
				15	36@0
				20	50@0
Note: Test frequencies are selected to fulfil Note 3 in Table 7.3B.2.3.3.1-1.					

Table 7.3B.2.3.4.1-2i: Test configurations table for exceptions due to UL harmonic interference for EN-DC 8_n77 (Test frequencies are selected to fulfil Requirement of Note 6 and 7 in Table 7.3B.2.3.3.1-1)

E-UTRA Band 8			NR Band 77		
Test ID	**Channel BW (MHz)**	**F_C (UL) (MHz) N_{UL}**	**NR F_C (UL) (MHz) N_{UL}**	**NR CBW**	**UL allocation (LCRB)**
1	5	882.5 MHz/ 21475	3530 MHz/ 635333	10	16@0
				15	25@0
				20	25@0
				40	25@0
				50	25@0
				60	25@0
2		897.5 MHz/ 21625	3590 MHz/ 639333	10	16@0
				15	25@0
				20	25@0
				40	25@0
				50	25@0
				60	25@0
3		912.5 MHz/ 21775	3650 MHz/ 643333	10	16@0
				15	25@0
				20	25@0
				40	25@0
				50	25@0
				60	25@0
Note: Test frequencies are selected to fulfil Note 6 and 7in Table 7.3B.2.3.3.1-1.					

Table 7.3B.2.3.4.1-2j: Test configurations table for exceptions due to UL harmonic interference for EN-DC 8_n78 (Requirement of Note 6 and 7)

E-UTRA Band 8			NR Band 78		
Test ID	Channel BW (MHz)	F_C (UL) (MHz) N_{UL}	NR F_C (UL) (MHz) N_{UL}	NR CBW	UL allocation (LCRB)
1	5	882.5 MHz/ 21475	3530 MHz/ 635333	10	16@0
				15	25@0
				20	25@0
				40	25@0
				50	25@0
				60	25@0
2		897.5 MHz/ 21625	3590 MHz/ 639333	10	16@0
				15	25@0
				20	25@0
				40	25@0
				50	25@0
				60	25@0
3		912.5 MHz/ 21775	3650 MHz/ 643333	10	16@0
				15	25@0
				20	25@0
				40	25@0
				50	25@0
				60	25@0
Note: Test frequencies are selected to fulfil Note 6 and 7in Table 7.3B.2.3.3.1-1.					

Table 7.3B.2.3.4.1-2k: Test configurations table for exceptions due to UL harmonic interference for EN-DC 8_n79 (Requirement of Note 4 and 5)

E-UTRA Band 8			NR Band 79		
Test ID	Channel BW (MHz)	F_C (UL) (MHz) N_{UL}	NR F_C (UL) (MHz) N_{UL}	NR CBW	UL allocation (LCRB)
1	5	882.5 MHz/ 21475	4412.5 MHz/ 694166	40	25@0
				50	25@0
				60	25@0
				80	25@0
				100	25@0
2		897.5 MHz/ 21625	4487.5 MHz/ 699166	40	25@0
				50	25@0
				60	25@0
				80	25@0
				100	25@0
3		912.5 MHz/ 21775	4652.5 MHz/ 704166	40	25@0
				50	25@0
				60	25@0
				80	25@0
				100	25@0
Note: Test frequencies are selected to fulfil Note 4 and 5 in Table 7.3B.2.3.3.1-1.					

Table 7.3B.2.3.4.1-2l: Test configurations table for exceptions due to UL harmonic interference for EN-DC 18_n77 (Requirement of Note 4)

E-UTRA Band 18			NR Band 77		
Test ID	Channel BW (MHz)	F_C (UL) (MHz) N_{UL}	NR F_C (UL) (MHz) N_{UL}	NR CBW	UL allocation (LCRB)
1	10	820 MHz/ 23900	4100 MHz/ 673333	10	16@0
				15	25@0
				20	25@0
				40	25@0
2		822.5 MHz/ 23925	4112.5 MHz/ 674166	10	16@0
				15	25@0
				20	25@0
				40	25@0
3		825 MHz/ 23950	4125 MHz/ 675000	10	16@0
				15	25@0
				20	25@0
				40	25@0
Note: Test frequencies are selected to fulfil Note 4 in Table 7.3B.2.3.3.1-1.					

Table 7.3B.2.3.4.1-2m: Test configurations table for exceptions due to UL harmonic interference for EN-DC 19_n77 (Requirement of Note 4 and 5)

E-UTRA Band 19			NR Band 77		
Test ID	Channel BW (MHz)	F_C (UL) (MHz) N_{UL}	NR F_C (UL) (MHz) N_{UL}	NR CBW	UL allocation (LCRB)
1	10	835 MHz/ 24050	4175 MHz/ 678333	10	16@0
				15	25@0
				20	25@0
				40	25@0
				50	25@0
				60	25@0
				80	25@0
				100	25@0
2		837.5 MHz/ 24075	4187.5 MHz/ 679166	10	16@0
				15	25@0
				20	25@0
				40	25@0
				50	25@0
				60	25@0
				80	25@0
				100	25@0
Note: Test frequencies are selected to fulfil Note 4 and 5 in Table 7.3B.2.3.3.1-1.					

Table 7.3B.2.3.4.1-2n: Test configurations table for exceptions due to UL harmonic interference for EN-DC 28_n77/n78 (Requirement of Note 4 and 5)

E-UTRA Band 28			NR Band 77/78		
Test ID	Channel BW (MHz)	F_C (UL) (MHz) N_{UL}	NR F_C (UL) (MHz) N_{UL}	NR CBW	UL allocation (LCRB)
1	10	708 MHz/ 27260	3540 MHz/ 636000	10	10@0
				15	15@0
				20	20@0
				40	25@0
				50	25@0
				60	25@0
				80	25@0
				90	25@0
				100	25@0
2		723 MHz/ 27410	3615 MHz/ 641000	10	10@0
				15	15@0
				20	20@0
				40	25@0
				50	25@0
				60	25@0
				80	25@0
				90	25@0
				100	25@0
3		743 MHz/ 27610	3715 MHz/ 647666	10	10@0
				15	15@0
				20	20@0
				40	25@0
				50	25@0
				60	25@0
				80	25@0
				90	25@0
				100	25@0
Note: Test frequencies are selected to fulfil Note 4 and 5 in Table 7.3B.2.3.3.1-1.					

Table 7.3B.2.3.4.1-2o: Test configurations table for exceptions due to UL harmonic interference for EN-DC 20_n77/78 (Requirement of Note 6 and 7)

E-UTRA Band 20			NR Band 77/78		
Test ID	Channel BW (MHz)	F_C (UL) (MHz) N_{UL}	NR F_C (UL) (MHz) N_{UL}	NR CBW	UL allocation (LCRB)
1	10	837 MHz/ 24200	3348 MHz/ 623300	5	8@0
				10	16@0
				15	25@0
				20	25@0
				40	25@0
2		847 MHz/ 24300	3388 MHz/ 625866	5	8@0
				10	16@0
				15	25@0
				20	25@0
				40	25@0
3		857 MHz/ 24400	3428 MHz/ 628533	5	8@0
				10	16@0
				15	25@0
				20	25@0
				40	25@0
Note: Test frequencies are selected to fulfil Note 6 in Table 7.3B.2.3.3.1-1.					

Table 7.3B.2.3.4.1-2p: Test configurations table for exceptions due to UL harmonic interference for EN-DC 26_n41 (Requirement of Note 8)

E-UTRA Band 26			NR Band 41		
Test ID	Channel BW (MHz)	F_C (UL) (MHz) N_{UL}	NR F_C (UL) (MHz) N_{UL}	NR CBW	UL allocation (LCRB)
1	10	835 MHz/ 26900	2505 MHz/ 501000	10	25@0
				15	25@0
				20	25@0
				40	25@0
				50	25@0
				60	25@0
				80	25@0
				90	25@0
2		844 MHz/ 26990	2532 MHz/ 506400	10	25@0
				15	25@0
				20	25@0
				40	25@0
				50	25@0
				60	25@0
				80	25@0
				90	25@0
Note: Test frequencies are selected to fulfil Note 8 in Table 7.3B.2.3.3.1-1.					

Table 7.3B.2.3.4.1-2q: Test configurations table for exceptions due to UL harmonic interference for EN-DC 26_n77/78 (Requirement of Note 6 and 7)

E-UTRA Band 20			NR Band 77/78		
Test ID	Channel BW (MHz)	F_C (UL) (MHz) N_{UL}	NR F_C (UL) (MHz) N_{UL}	NR CBW	UL allocation (LCRB)
1	10	831.5 MHz/ 26865	3276 MHz/ 621733	5	8@0
				10	16@0
				15	25@0
				20	25@0
				40	25@0
2		844 MHz/ 226990	3376 MHz/ 625066	5	8@0
				10	16@0
				15	25@0
				20	25@0
				40	25@0
Note: Test frequencies are selected to fulfil Note 6 and 7 in Table 7.3B.2.3.3.1-1.					

Table 7.3B.2.3.4.1-2r: Test configurations table for exceptions due to UL harmonic interference for EN-DC 26_n77 (Requirement of Note 4)

E-UTRA Band 26			NR Band 77		
Test ID	Channel BW (MHz)	F_C (UL) (MHz) N_{UL}	NR F_C (UL) (MHz) N_{UL}	NR CBW	UL allocation (LCRB)
1	10	819 MHz/ 26740	4095 MHz/ 673000	5	8@0
				10	16@0
				15	25@0
				20	25@0
				40	25@0
				50	25@0
				60	25@0
				80	25@0
				100	25@0
2		831.5 MHz/ 26865	4158 MHz/ 677200	5	8@0
				10	16@0
				15	25@0
				20	25@0
				40	25@0
				60	25@0
				80	25@0
				90	25@0
				100	25@0
Note: Test frequencies are selected to fulfil Note 4 in Table 7.3B.2.3.3.1-1.					

Table 7.3B.2.3.4.1-2s: Test configurations table for exceptions due to UL harmonic interference for EN-DC 66_n78 (Requirement of Note 1 and 2)

E-UTRA Band 66			NR Band 78		
Test ID	Channel BW (MHz)	F_C (UL) (MHz) N_{UL}	NR F_C (UL) (MHz) N_{UL}	NR CBW	UL allocation (LCRB)
1	10	1715 MHz/ 132022	3430 MHz/ 628666	10	26@0
				15	39@0
				20	53@0
				40	100@0
2		1755 MHz/ 132422	3510 MHz/ 634000	10	26@0
				15	39@0
				20	53@0
				40	100@0
3		1775 MHz/ 132622	3550 MHz/ 636666	10	26@0
				15	39@0
				20	53@0
				40	100@0
Note: Test frequencies are selected to fulfil Note 1 and 2 in Table 7.3B.2.3.3.1-1.					

Table 7.3B.2.3.4.1-2t: Test configurations table for exceptions due to UL harmonic interference for EN-DC 66_n78 (Requirement of Note 3)

E-UTRA Band 66			NR Band 78		
Test ID	Channel BW (MHz)	F_C (UL) (MHz) N_{UL}	NR F_C (UL) (MHz) N_{UL}	NR CBW	UL allocation (LCRB)
1	10	1715 MHz/ 132022	3390 MHz/ 626000 3470 MHz/ 631333	10	26@0
				15	39@0
				20	53@0
				40	100@0
2		1755 MHz/ 132422	3470 MHz/ 631333 3550 MHz/ 636666	10	26@0
				15	39@0
				20	53@0
				40	100@0
3		1775 MHz/ 132622	3510 MHz/ 634000 3590 MHz/ 639333	10	26@0
				15	39@0
				20	53@0
				40	100@0
Note: Test frequencies are selected to fulfil Note 3 in Table 7.3B.2.3.3.1-1.					

Table 7.3B.2.3.4.1-3: Initial test conditions for reference sensitivity exceptions due to due to receiver harmonic mixing for EN-DC in NR FR1

Initial Conditions							
Test Environment as specified in TS 38.508-1 [6] subclause 4.1				Normal, TL/VL, TL/VH, TH/VL, TH/VH			
NR Test Frequencies as specified in TS 38.508-1 [6] subclause4.3.1, E-UTRA Test Frequencies as specified in TS36.508 [11] subclause 4.3.1				Specified in Table 7.3B.2.3.4.1-3			
NR Test Channel Bandwidths as specified in TS 38.508-1 [6] subclause 4.3.1				Specified in Table 7.3B.2.3.4.1-3			
NR Test SCS as specified in Table 5.3.5-1				Lowest supported SCS per test channel BW unless specified			
E-UTRA Test Channel Bandwidths as specified in TS 36.508 [11] subclause 4.3.1				Specified in Table 7.3B.2.3.4.1-3			
NR Test Parameters							
Downlink Configuration				**Uplink Configuration**			
NR Modulation	**NR RB allocation**	**E-UTRA Modulation**	**E-UTRA RB allocation**	**NR Modulation**	**NR RB allocation**	**E-UTRA Modulation**	**E-UTRA RB allocation**
CP-OFDM QPSK	Full RB (NOTE 1)	QPSK	Full RB (NOTE 1)	DFT-s-OFDM QPSK	Specified in Table 7.3B.2.3.4.1-2	QPSK	Specified in Table 7.3B.2.3.4.1-2

Table 7.3B.2.3.4.1-3a: Test configurations table for exceptions due to receiver harmonic mixing for EN-DC 2_n71

	E-UTRA Band 2		NR Band 71		
Test ID	Channel BW (MHz)/ RB allocation	F_C (UL)	NR F_C (UL)	NR Ch BW	UL allocation (LCRB)
1	5 25@0	Low, Mid, High	Low, Mid	5	25@0
				10	50@0
				15	75@0
				20	100@0
2	10 50@0	Low, Mid, High	Low, Mid	5	25@0
				10	50@0
				15	75@0
				20	100@0
3	15 50@0	Low, Mid, High	Low, Mid	5	25@0
				10	50@0
				15	75@0
				20	100@0
34	20 50@	Low, Mid, High	Low, Mid	5	25@0
				10	50@0
				15	75@0
				20	100@0
Note: Test frequencies are selected to fulfil Note 4 in Table 7.3B.2.3.3.2-1.					

Table 7.3B.2.3.4.1-3b: Test configurations table for exceptions due to receiver harmonic mixing for EN-DC n41_26

	NR Band n41		E-UTRA Band 46		
Test ID	Channel BW (MHz) / RB allocation	NR F_C (UL)	F_C (UL)	E-UTRA Ch BW	UL allocation (LCRB)
1	5 MHz/ 15@0	Mid	Low, Mid, High	5	25@0
				10	50@0
				15	75@0
2	10 MHz 25@0	Mid	Low, Mid, High	5	25@0
				10	50@0
				15	75@0
3	15 MHz 25@0	Mid	Low, Mid, High	5	25@0
				10	50@0
				15	75@0
4	20 MHz 25@0	Mid	Low, Mid, High	5	25@0
				10	50@0
				15	75@0
Note: Test frequencies are selected to fulfil Note 4 in Table 7.3B.2.3.3.2-1.					

Table 7.3B.2.3.4.1-3c: Test configurations table for exceptions due to receiver harmonic mixing for EN-DC 41_n77

	E-UTRA Band 41		NR Band n77			
Test ID	Channel BW (MHz)/ RB allocation	Fc (UL)	NR Fc (UL)	NR Ch BW	SCS (kHz)	UL allocation (LCRB)
1	5/ 25@0	Low, Mid, High	Mid, High	10	15	50@0
				15	15	75@0
				20	15	100@0
				40	15	216@0
				50	15	270@0
				60	30	162@0
				80	30	216@0
				90	30	243@0
2	10/ 25@0	Low, Mid, High	Mid, High	10	15	50@0
				15	15	75@0
				20	15	100@0
				40	15	216@0
				50	15	270@0
				60	30	162@0
				80	30	216@0
				90	30	243@0
3	15/ 25@0	Low, Mid, High	Mid, High	10	15	50@0
				15	15	75@0
				20	15	100@0
				40	15	216@0
				50	15	270@0
				60	30	162@0
				80	30	216@0
				90	30	243@0
4	20/ 25@0	Low, Mid, High	Mid, High	10	15	50@0
				15	15	75@0
				20	15	100@0
				40	15	216@0
				50	15	270@0
				60	30	162@0
				80	30	216@0
				90	30	243@0
Note: Test frequencies are selected to fulfil Note 7 in Table 7.3B.2.3.3.2-1.						

Table 7.3B.2.3.4.1-3d: Test configurations table for exceptions due to receiver harmonic mixing for EN-DC 41_n78

	E-UTRA Band 41		NR Band n78			
Test ID	Channel BW (MHz)/ RB allocation	F_C (UL)	NR F_C (UL)	NR Ch BW	SCS (kHz)	UL allocation (LCRB)
1	5/ 25@0	Low	High	10	15	50@0
				15	15	75@0
				20	15	100@0
				40	15	216@0
				50	15	270@0
				60	30	162@0
				80	30	216@0
				90	30	243@0
2	10/ 25@0	Low	High	10	15	50@0
				15	15	75@0
				20	15	100@0
				40	15	216@0
				50	15	270@0
				60	30	162@0
				80	30	216@0
				90	30	243@0
3	15/ 25@0	Low	High	10	15	50@0
				15	15	75@0
				20	15	100@0
				40	15	216@0
				50	15	270@0
				60	30	162@0
				80	30	216@0
				90	30	243@0
4	20/ 25@0	Low	High	10	15	50@0
				15	15	75@0
				20	15	100@0
				40	15	216@0
				50	15	270@0
				60	30	162@0
				80	30	216@0
				90	30	243@0
Note: Test frequencies are selected to fulfil Note 7 in Table 7.3B.2.3.3.2-1.						

Table 7.3B.2.3.4.1-3f: Test configurations table for exceptions due to receiver harmonic mixing for EN-DC n71_n2

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Table 7.3B.2.3.4.1-3h: Test configurations table for exceptions due to receiver harmonic mixing for EN-DC n77_41

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Table 7.3B.2.3.4.1-3i: Test configurations table for exceptions due to receiver harmonic mixing for EN-DC n77_28

	NR Band n77		E-UTRA Band 28		
Test ID	Channel BW (MHz)	NR Fc (UL)	Fc (UL)	E-UTRA Ch BW	UL allocation (LCRB)
1	10 MHz	Mid, High	Low, Mid, High	5	25@0
				10	50@0
				15	75@0
				20	100@
2	15 MHz	Mid, High	Low, Mid, High	5	25@0
				10	50@0
				15	75@0
				20	100@
3	20 MHz	Mid, High	Low, Mid, High	5	25@0
				10	50@0
				15	75@0
				20	100@
Note: Test frequencies are selected to fulfil Note 2 in Table 7.3B.2.3.3.2-1.					

Table 7.3B.2.3.4.1-3j: Test configurations table for exceptions due to receiver harmonic mixing for EN-DC n78_41

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Editor's Note - Note 8 pending clarification

Table 7.3B.2.3.4.1-3k: Test configurations table for exceptions due to receiver harmonic mixing for EN-DC n79_19

	NR Band n79		E-UTRA Band 19		
Test ID	Channel BW (MHz)	NR Fc (UL)	Fc (UL)	E-UTRA Ch BW	UL allocation (LCRB)
1	40 MHz	Low	High	5	25@0
				10	50@0
				15	75@0
2	50 MHz	Low	High	5	25@0
				10	50@0
				15	75@0
Note: Test frequencies are selected to fulfil Note 2 in Table 7.3B.2.3.3.2-1.					

Table 7.3B.2.3.4.1-3l: Test configurations table for exceptions due to receiver harmonic mixing for EN-DC n79_21

	NR Band n79		E-UTRA Band 19		
Test ID	Channel BW (MHz)	NR Fc (UL)	Fc (UL)	E-UTRA Ch BW	UL allocation (LCRB)
1	40 MHz	Low[2]	Low, Mid, High	5	25@0
				10	50@0
				15	75@0
2	50 MHz	Low[2]	Low, Mid, High	5	25@0
				10	50@0
				15	75@0
Note 1: Test frequencies are selected to fulfil Note 3 in Table 7.3B.2.3.3.2-1. Note 2: Test point $f_{UL/DL}$ = 4510.2 MHz (N_{DL} = 700680).					

Editor's Note: – Note 3 equation pending clarification

Table 7.3B.2.3.4.1-3m: Test configurations table for exceptions due to receiver harmonic mixing for EN-DC n79_26

	NR Band n79		E-UTRA Band 26		
Test ID	**Channel BW (MHz)**	**NR F_C (UL)**	**F_C (UL)**	**E-UTRA Ch BW**	**UL allocation (LCRB)**
1	40 MHz	Low	High	5	25@0
				10	50@0
				15	75@0
2	50 MHz	Low	High	5	25@0
				10	50@0
				15	75@0
Note: Test frequencies are selected to fulfil Note 2 in Table 7.3B.2.3.3.2-1.					

Table 7.3B.2.3.4.1-4: Test configurations table for reference sensitivity exceptions due to close proximity of bands for EN-DC in NR FR1

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Table 7.3B.2.3.4.1-5: Test configurations table for reference sensitivity exceptions due to cross band isolation for EN-DC in NR FR1

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Table 7.3B.2.3.4.1-6: Test Configuration Table Reference sensitivity exceptions due to dual uplink operation for EN-DC in NR FR1 (two bands)

Initial Conditions	
Test Environment as specified in TS 38.508-1 [6] subclause 4.1	NC, TL/VL, TL/VH, TH/VL, TH/VH
NR Test Frequencies as specified in TS 38.508-1 [6] subclause4.3.1, E-UTRA Test Frequencies as specified in TS36.508 [11] subclause 4.3.1	For test frequencies refer to “Range” columns.
Test DC Combination setting (N_{RB_agg}) as specified in subclause [TBD] for the DC Configuration across bandwidth combination sets supported by the UE.	Refer to “NR N_{RB}”and “E-UTRA N_{RB} ” columns
Network signalling value	NS_01 Unless given by Table 7.3.3-3 for the band with active uplink carrier

Test Parameters for DC Configurations												
ID	**DC Configuration / N_{RB_agg}**						**DL Allocation**			**UL Allocation (Note 2,3)**		
	DC Configuration				**E-UTRA Ch BW/N_{RB}**	**NR Ch BW/N_{RB}**	**CC MOD E-UTRA/NR**	**E-UTRA & NR RB allocation**		**CC MOD E-UTRA/NR**	**E-UTRA & NR allocations (L_{CRB} @ RB_{start})**	
	E-UTRA		**NR**					**PCC**	**SCC**			
	Band	**Range**	**Band**	**Range**								
Default Test Settings for a DC_XA-nYA Configuration												
1	X	Mid	Y	Mid	Mid/ Lowest N_{RB}	Mid/ Lowest N_{RB}	QPSK /CP-OFDM QPSK	All RBs		QPSK/ DFT-s-OFDM QPSK	REFSENS	REFSENS
2	X	Mid	Y	Mid	Mid/ Highest N_{RB}	Mid/ Highest N_{RB}	QPSK /CP-OFDM QPSK	All RBs		QPSK/ DFT-s-OFDM QPSK	REFSENS	REFSENS
Test Settings for DC_1A-n77A Configuration												
1	1	Note 5	77	Note 5	5/25	10/25	Note 7	All RBs		Note 7	25@0	25@0
Test Settings for DC_1A-n78A Configuration												
1	1	Note 5	78	Note 5	5/25	10/25	Note 7	All RBs		Note 7	25@0	25@0
Test Settings for DC_2A-n66A Configuration												
1	2	Note 5	66	Note 5	5/25	5/25	Note 7	All RBs		Note 7	25@0	25@0
Test Settings for DC_2A-n78A Configuration												
1	2	Note 5	78	Note 5	5/25	10/50	Note 7	All RBs		Note 7	25@0	50@0
Test Settings for DC_3A-n77/n7878A Configuration												
1	3	Note 5	77/ 78	Note 5	5/25	10/50	Note 7	All RBs		Note 7	25@0	50@0
Test Settings for DC_3A-n78A Configuration												
1	3	Note 5	78	Note 5	5/25	10/25	Note 7	All RBs		Note 7	50@0	25@0
Test Settings for DC_5A-n78A Configuration												
1	5	Note 5	78	Note 5	5/25	10/52	Note 7	All RBs		Note 7	25@0	52@0
Test Settings for DC_8A-n77A/n78A Configuration												
1	8	Note 5	77	Note 5	5/25	10/52	Note 7	All RBs		Note 7	25@0	52@0
2	8	Note 5	78	Note 5	5/25	10/52	Note 7	All RBs		Note 7	25@0	52@0
Test Settings for DC_8A-n79A Configuration												
1	8	Note 5	79	Note 5	5/25	40/216	Note 7	All RBs		Note 7	25@0	216@0
Test Settings for DC_20A-n77A Configuration												
1	20	Note 5	77	Note 5	5/25	10/50	Note 7	All RBs		Note 7	25@0	50@0
2	20	Note 5	77	Note 5	5/25	10/50	Note 7	All RBs		Note 7	25@0	50@0

Test Settings for DC_20A-n78A Configuration											
1	20	Note 5	78	Note 5	5/25	10/50	Note 7	All RBs	Note 7	25@0	50@0
Test Settings for DC_21A- n79A Configuration											
1	21	Note 5	79	Note 5	5/25	40/216	Note 7	All RBs	Note 7	25@0	216@0
Test Settings for DC_28A- n77/n78A Configuration											
1	28	Note 5	77	Note 5	5/25	10/25	Note 7	All RBs	Note 7	50@0	25@0
2	28	Note 5	78	Note 5	5/25	10/25	Note 7	All RBs	Note 7	50@0	25@0
Test Settings for DC_66A-n78A Configuration											
1	66	Note 5	78	Note 5	5/25	10/25	Note 7	All RBs	Note 7	50@0	25@0
Test Settings for CA_7A-20A Configuration											
1	7	Note 5	20	Note 5	50	25	QPSK	All RBs	QPSK	50@0	25@0

Note 1: Both of the transmitters shall be set min(+20 dBm, $P_{CMAX\_L,c}$) as defined in subclause 6.2.5A. In case Single UL is allowed and the UE only indicates support of "Single UL" the output power of the active UL shall be set at $P_{CMAX\_L,c}$ or set to the maximum output power according to the UE power scaling capability.

Note 2: Use DC Configuration – specific test points if present in the table, otherwise use test points from matching Group Test Settings, if present in the table. Otherwise use the Default Test Settings test points.

Note 3: X,Y correspond to the different bands in the DC Configuration. E.g. for DC_1A-n3A, X=1, Y=3.

Note 4: REFSENS refers to the E_UTRA bands and NR band N_{RB} 's single carrier Uplink RB allocation for reference sensitivity according to table 7.3.5-2 of TS 36.521-1 and Table 7.3.2.4.1-3 of TS 38.521-1, respectively

Note 5: Test frequency for each DC configuration shall follow Table 7.3B.2.3.3.5.1-1. If test configurations of each ID in a DC configuration are same, test frequency shall follow the order of Table 7.3B.2.3.3.5.1-1.

Note 6: Not applicable if the UE only supports Bandwidth Combination Set 1.

Note 7: Same as default.

Note 8: RB_{START} = 0

Table 7.3B.2.3.4.1-6: Test Configuration Table Reference sensitivity exceptions due to dual uplink operation for EN-DC in NR FR1 (three bands)

Initial Conditions	
Test Environment as specified in TS 38.508-1 [6] subclause 4.1	NC, TL/VL, TL/VH, TH/VL, TH/VH
NR Test Frequencies as specified in TS 38.508-1 [6] subclause4.3.1, E-UTRA Test Frequencies as specified in TS36.508 [11] subclause 4.3.1	For test frequencies refer to “Range” columns. Fo columns
Test DC Combination setting (NRB_agg) as specified in subclause [TBD] for the DC Configuration across bandwidth combination sets supported by the UE.	Refer to “NR NRB”and “E-UTRA NRB ” columns
Network signalling value	NS_01 by default, exceptions listed in Table 7.3.3

Test Parameters for DC Configurations										
ID	**PCC – E-UTRA**				**SCC1 – EUTRA/NR**					
	Band	**Range**	**NRB**		**Band**	**Range**	**NRB**		**Band**	**Ra**
	UL MOD	**DL MOD**	**CH BW/ UL alloc (Note 2,3,4)**	**DLalloc**	**UL MOD**	**DL MOD**	**UL/DL Ch BW alloc**	**DLalloc / ULalloc**	**UL MOD**	**UL RB**
Default Test Settings for a DC_XA-YA-ZA Configuration (Inter-band)										
1	X	Note 0	REFSENS	All RBs	Y	Mid	Mid	All RBs	Z	I
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK /CP-OFDM QPSK		All RBs	CP-OFDM QPSK	REF
2	Y	Mid	REFSENS	All RBs	Y	Mid	Mid	All RBs	Z	I
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK /CP-OFDM QPSK		All RBs$_{B}$	CP-OFDM QPSK	REF
3	Z	Mid	REFSENS	All RBs	Y	Mid	Mid	All RBs	XX	I
	QPSK	QPSK		Highest N_{RB}	N/A	QPSK /CP-OFDM QPSK		All RBs	CP-OFDM QPSK	REF
Test Settings for DC_1A-3A-n78A Configuration										
1	1	Note 0	5 MHz 25@0	All RBs	3	Note 0	5 MHz	All RBs	n78	N
	QPSK	QPSK		100	N/A	QPSK		25@0	CP-OFDM QPSK	10 5
2	1	Note 0	5 MHz 25@0	All RBs	3	Note 0	5 MHz	All RBs	n78	N
	QPSK	QPSK		100	N/A	QPSK		25@0	CP-OFDM QPSK	10 5
3	1	Note 0	5 MHz 25@0	All RBs	3	Note 0	5 MHZ	All RBs	n78	N
	QPSK	QPSK		100	N/A	QPSK		25@0	CP-OFDM QPSK	10 5
Test Settings for DC_1A-5A-n78A Configuration										
1	1	Note 0	5 MHz 25@0	All RBs	5	Note 0	5 MHz	All RBs	n78	N
	QPSK	QPSK		100	N/A	QPSK		25@0	CP-OFDM QPSK	10 5
Test Settings for DC_1A-7A-n78A Configuration										
1	1	Note 0	5 MHz 25@0	All RBs	7	Note 0	5 MHz	All RBs	n78	N
	QPSK	QPSK		100	N/A	QPSK		25@0	CP-OFDM QPSK	10 5
2	1	Note 0	5 MHz 25@0	All RBs	7	Note 0	10 MHz	All RBs	n78	N
	QPSK	QPSK		100	N/A	QPSK		50@0	CP-OFDM QPSK	10 5
Test Settings for DC_1A-20A-n78A Configuration										
1	1	Note 0	5 MHz 25@0	All RBs	20	Note 0	5 MHz	All RBs	n78	N
	QPSK	QPSK		100	N/A	QPSK		25@0	CP-OFDM QPSK	10 5
Test Settings for DC_3A-5A-n78A Configuration										
1	3	Note 0	5 MHz 25@0	All RBs	5	Note 0	5 MHz	All RBs	n78	N
	QPSK	QPSK		100	N/A	QPSK		25@0	CP-OFDM QPSK	10 5
2	3	Note 0	5 MHz 25@0	All RBs	5	Note 0	5 MHz	All RBs	n78	N
	QPSK	QPSK		100	N/A	QPSK		25@0	CP-OFDM QPSK	10 2
Test Settings for DC_3C-7C-n78A with UL CA Configuration										
1	3	Note 0		All RBs	7	Note 0	5 MHz	All RBs	n78	N

	QPSK	QPSK	5 MHz 25@0	100	N/A	QPSK		25@0	CP-OFDM QPSK	10 5
Test Settings for DC_3A-7A_n78A Configuration										
1	3	Note 0	5 MHz 25@0	All RBs	7	Note 0	5 MHz	All RBs	n78	N
	QPSK	QPSK		100	N/A	QPSK		25@0	CP-OFDM QPSK	10 5
Test Settings for DC_3C-7A_n78A Configuration										
1	3	Note 0	5 MHz 25@0	All RBs	7	Note 0	5 MHz	All RBs	n78	N
	QPSK	QPSK		100	N/A	QPSK		25@0	CP-OFDM QPSK	10 5
Test Settings for DC_3A-20A_n78A Configuration										
1	3	Note 0	5 MHz 25@0	All RBs	20	Note 0	5 MHz	All RBs	n78	N
	QPSK	QPSK		100	N/A	QPSK		25@0	CP-OFDM QPSK	10 5
Test Settings for DC_3C-20A_n78A Configuration										
1	3	Note 0	5 MHz 25@0	All RBs	20	Note 0	5 MHz	All RBs	n78	N
	QPSK	QPSK		100	QPSK	QPSK		25@0	CP-OFDM QPSK	10 5
Test Settings for DC_5A-7A_n78A Configuration										
1	5	Note 0	5 MHz 25@0	All RBs	7	Note 0	5 MHz	All RBs	n78	N
	QPSK	QPSK		100	QPSK	QPSK		25@0	CP-OFDM QPSK	10 5
Test Settings for DC_7A-20A_n78A Configuration										

1	7	Note 0	5 MHz 25@0	All RBs	20	Note 0	5 MHz	All RBs	n78	N
	QPSK	QPSK		100	QPSK	QPSK		25@0	CP-OFDM QPSK	10 5
Test Settings for DC_7A-28A_n78A Configuration										
1	7	Note 0	5 MHz 25@0	All RBs	28	Note 0	5 MHz	All RBs	n78	N
	QPSK	QPSK		100	QPSK	QPSK		25@0	CP-OFDM QPSK	10 5

Note 0: Test frequency for each DC configuration shall follow Table 7.3B.2.3.3.5.2-1. If test configurations of each ID in a I frequency shall follow the order of Table 7.3B.2.3.3.5.2-1.
Note 1: CA Configuration Test CC Combination test settings are checked separately for each CA Configuration.
Note 2: **Intra-band contiguous & Intra-band contiguous + Inter-band:** Use CA Configuration – specific test points if pre Default Test Settings test points.
Note 3: **Inter-band:** Use CA Configuration – specific test points if present in the table, Otherwise use test points from matc in the table. Otherwise use the Default Test Settings test points.
Note 4: **Inter-band & Intra-band contiguous + Inter-band:** If, according to the UE declared capability, UE does not supp the CA Configuration, test points with that individual band as PCC are not applicable.
Note 5: **Intra-band contiguous:** X corresponds to the band of the CA Configuration. E.g. for CA_41D, X=41
Note 6: **Inter-band:** X,Y,Z correspond to the different bands in the CA Configuration. E.g. for CA_1A-3A-19A,X=1,Y=3,Z=
Note 7: **Intra-band contiguous + Inter-band:** X,Y correspond to the different bands in the CA Configuration, e.g. for CA_ X=1,Y=42
Note 8: REFSENS refers to the PCC bands and PCC N_{RB} 's single carrier Uplink RB allocation for reference sensitivity ac
Note 9: **Intra-band contiguous:** If in the CA Configuration UE supports multiple CC Combinations with the same N_{RB_agg} , with maximum N_{RB_PCC} and then select maximum N_{RB_SCC1} for the chosen N_{RB_PCC}
Note 10: Band 12: f_{UL} = 706.7 MHz (N_{UL} = 23087), f_{DL} = 736.7 MHz (N_{DL} = 5087)
Band 4: f_{DL} = 2120.1 MHz (N_{DL} = 2051)
Note 11: Band 12: f_{UL} = 710.9 MHz (N_{UL} = 23129), f_{DL} = 740.9 MHz (N_{DL} = 5129)
Band 4: f_{DL} = 2132.7 MHz (N_{DL} = 2177)
Note 12: N/A
Note 13: Test points that fulfil criteria of Note 4 in Table 7.3A.5.5-3.
Note 14: Only Band 1 and Band 42 need to be tested and Band 3 does not need to be tested.
Note 15: Only Band 1 and Band 3 need to be tested and Band 42 does not need to be tested.
Note 16: Band 3: fUL = 1720MHz (NUL = 19300), fDL = 1815MHz (NDL = 1300)
Band 42: fUL/DL = 3440MHz (NUL/DL = 41990)
Note 17: Band 3: fUL = 1775MHz (NUL = 19850), fDL = 1870MHz (NDL = 1850)
Band 42: fUL/DL = 3520MHz (NDL = 42790)
Note 18: N/A
Note 19: Only Band 1 and Band 19 need to be tested and Band 28 does not need to be tested.
Note 20: **Intra-band contiguous + Inter-band:** If in the CA Configuration UE supports multiple CC Combinations with the s Combination with N_{RB_PCC} = N_{RB_SCC1} for testing. If no such combination is supported, choose Combination with ma
Note 21: Band 42: $f_{UL/DL}$ for SCC1 = 3430.2MHz ($N_{UL/DL}$ = 41892), $f_{UL/DL}$ for SCC2 = 3450MHz ($N_{UL/DL}$ = 42090).
Note 22: Band 42: $f_{UL/DL}$ for SCC1 = 3500.2MHz ($N_{UL/DL}$ = 42592), $f_{UL/DL}$ for SCC2 = 3520MHz ($N_{UL/DL}$ = 42790).
Note 23: Band 28: f_{UL} = 719.3MHz (N_{UL} = 27373), f_{DL} = 774.3MHz (N_{DL} = 9373).
Note 24: Band 42: $f_{UL/DL}$ for SCC1 = 3515.8MHz (N_{UL} = 42748), $f_{UL/DL}$ for SCC2 = 3527.5MHz (N_{DL} = 42865).
Note 25: Band 8: f_{UL} = 897.5MHz (N_{UL} = 21625), f_{DL} = 942.5MHz (N_{DL} = 3625), Band 42: $f_{UL/DL}$ = 3590MHz ($N_{UL/DL}$ = 4349
Note 26: Band 28: f_{UL} = 722.5 MHz (N_{UL} = 27405), f_{DL} = 777.5 MHz (N_{DL} = 9405), Band 1: f_{DL} = 2167.5 MHz (N_{DL} = 575).
Note 27: Band 28: f_{UL} = 743 MHz (N_{UL} = 27610), f_{DL} = 798 MHz (N_{DL} = 9610). Band 11: f_{DL} = 1480.9 MHz (N_{DL} = 4800).
Note 28: Band 12: f_{UL} = 704MHz (N_{UL} = 23060), f_{DL} = 734MHz (N_{DL} = 5060)
Band 66: f_{UL} = 1712.5MHz (N_{UL} = 131997), f_{DL} = 2112.5MHz (N_{DL} = 66461)
Note 29: Band 12: f_{UL} = 707.5MHz (N_{UL} = 23095), f_{DL} = 737.5MHz (N_{DL} = 5095)
Band 66: f_{UL} = 1720MHz (N_{UL} = 132072), f_{DL} = 2120MHz (N_{DL} = 66536)
Note 30: Band 12: f_{UL} = 711MHz (N_{UL} = 23130), f_{DL} = 741MHz (N_{DL} = 5130)
Band 66: f_{UL} = 1717.5MHz (N_{UL} = 132047), f_{DL} = 2117.5MHz (N_{DL} = 66511).
Note 31: Band 3: f_{UL} = 1757.4MHz (N_{UL} = 19674), f_{DL} = 1852.4MHz (N_{DL} = 1674),
Band 11: f_{DL} = 1480.9MHz (N_{DL} = 4800).
Note 32: Band 3: f_{DL} = 1852.4MHz (N_{DL} = 1674),
Band 11: f_{UL} = 1432.9MHz (N_{UL} = 22800), f_{DL} = 1480.9MHz (N_{DL} = 4800).
Note 33: Band 2: f_{UL} = 1868.3MHz (N_{UL} = 18783), f_{DL} = 1948.3MHz (N_{DL} = 783).
Band 4: f_{UL} = 1735MHz (N_{UL} = 20200), f_{DL} = 2135MHz (N_{DL} = 2200).
Note 34: The orders and numbering of SCCs in this table does not imply any order in test implementation of SCCs.
Note 35: Band 3: f_{UL} = 1737MHz (N_{UL} = 19470), f_{DL} = 1832MHz (N_{DL} = 1470).
Band 7: f_{UL} = 2543MHz (N_{UL} = 23430), f_{DL} = 2663MHz (N_{DL} = 3180).
Band 20: f_{UL} = 847MHz (N_{UL} = 24300), f_{DL} = 806MHz (N_{DL} = 6300).
Note 36: Band 3: f_{UL} = 1775MHz (N_{UL} = 19850), f_{DL} = 1870MHz (N_{DL} = 1850).
Band 7: f_{UL} = 2510MHz (N_{UL} = 23100), f_{DL} = 2630MHz (N_{DL} = 2850).
Band 20: f_{UL} = 855MHz (N_{UL} = 24380), f_{DL} = 814MHz (N_{DL} = 6380).
Note 37: Band 7: f_{UL} = 2512MHz (N_{UL} = 23120), f_{DL} = 2632MHz (N_{DL} = 2512).
Band 20: f_{UL} = 851MHz (N_{UL} = 24340), f_{DL} = 851MHz (N_{DL} = 6340).
Note 38: Test frequency for each CA configuration shall follow Table 7.3A.0-0f. If test configurations of each ID in a CA con shall follow the order of Table 7.3A.0-0f.
Note 39: Test frequency for each CA configuration shall follow Table 7.3A.0-0g. If test configurations of each ID in a CA cor shall follow the order of Table 7.3A.0-0g.

Table 7.3B.2.3.4.1-7: Test Configuration Table Reference sensitivity exceptions due to Tx leakage issue (three bands)

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1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.1.1 for TE diagram and section A.3.2.1 for UE diagram.

2. The parameter settings for NR cell are set up according to TS 38.508-1 [5] subclause 4.4.3. The parameter settings for E-URA cell are set up according to TS 36.508 [11] subclause 4.4.3

3. NR downlink signals are initially set up according to Annex C.0, C.1, C.2, C.3.1, and uplink signals according to Annex G.0, G.1, G.2, and G.3.1 of TS38.521-1 [8].

4. E-UTRA downlink signals are initially set up according to Annex C0, C.1 and C.3.0, and uplink signals according to Annex H.1 and H.3.0 of TS36.521-1[10].

5. The UL Reference Measurement channels for NR are set according to Table 6.5.3.1.4.1-1 of TS38.521-1[8]. The UL Reference Measurement channels for E-UTRA are set according to Table 7.3B.2.3.4.1-1. The UL Reference Measurement channels configurations for exceptional cases are set according to Table 7.3B.2.3.4.1-2 to Table 7.3B.2.3.4.1-7.

6. NR propagation conditions are set according to Annex B.0. E-UTRA propagation conditions are set according to Annex B.0 of TS 36.521-1 [10]

7. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* are set according to TS 38.508-1[6] clause 4.5. Message contents are defined in clause 7.3B.2.1.4.3.

8. For exceptional test cases, initial test conditions described in Table 7.3B.2.3.4.1-2 to Table 7.3B.2.3.4.1-7 shall be used.

7.3B.2.3.4.2 Test procedure

1. NR SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format [0_1] for C_RNTI to schedule the UL RMC according to Table 7.3B.2.3.4-1 on both EN-DC component carriers. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

2. E-UTRA SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC according to Table 6.6.3.1.4.1-1 of TS36.521-1[10]. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

3. Set the Downlink signal level to the appropriate REFSENS value defined in TS 38.521-1 [8], Table 7.3.3-1 for NR band and TS 36.521-1[10] Table 7.3.3-1 for E-UTRA band. Send continuously uplink power control "up" commands in the uplink scheduling information to both carriers to ensure the UE transmits PUMAX level for at least the duration of the Throughput measurement.

4. Measure the average throughput of both NR and E-UTRA for a duration sufficient to achieve statistical significance according to Annex H.2 of TS 38.521-1[8] for NR band, and Annex G.2 of TS36.521-1[10] for EUTRA band.

7.3B.2.3.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 for NR band. Message contents are according to TS 36.508 [7] subclause 4.6 for EUTRA band.

7.3B.2.3.5 Test requirement

For inter-band EN-DC configurations, the throughput of each CG shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with reference receive power level specified in Tables 7.3.2.5-1 and parameters specified Tables 7.3.2.4.1-1, Tables 7.3.2.4.1-2 and Tables 7.3.2.4.1-3 in TS 38.521-1 [8] for NR band, and reference measurement channels as specified in Annex A.3.2 of TS 36.521-1 [10] with parameters specified in Tables 7.3.5-1 and Table 7.3.5-2 of TS 36.521-1 [10].

For inter-band EN-DC within FR1, the reference sensitivity exceptions are allowed for specified test scenarios described in subclause 7.3B.2.3.5.1, 7.3B.2.3.5.2, 7.3B.2.3.5.3, 7.3B.2.3.5.4. and 7.3B.2.3.5.5 below.

7.3B.2.3.5.1 Reference sensitivity test requirement exceptions due to UL harmonic interference for EN-DC in NR FR1

Reference sensitivity exceptions due to UL harmonic interference for EN-DC in NR FR1, are specified in Table 7.3B.2.3.5.1-1 with uplink configuration specified in Table 7.3B.2.3.5.1-2.

Table 7.3B.2.3.5.1-1: Reference sensitivity due to UL harmonic for EN-DC in NR FR1

UL band	DL band	SCS (kHz)	5 MHz (dB)	10 MHz (dB)	15 MHz (dB)	20 MHz (dB)	25 MHz (dB)	30 MHz (dB)	40 MHz (dBm)	50 MHz (dBm)	60 MHz (dBm)	80 MHz (dBm)	90 MHz (dBm)	100 MHz (dBm)
1, 3	n77[1,2]	15		-71.4 +TT	-71.4 +TT	-71.3			-71.2					
		30		-71.7	-71.5	-71.5			-71.3					
		60		-72.1	-71.8	-71.7			-71.5					
	n77[3]	15		-94.2	-92.7	-91.9								
		30		-94.5	-92.8	-92.1								
		60		-94.9	-93.1	-92.3								
2	n78[1,2]	15		-71.4	-71.4	-71.3			-71.2					
		30		-71.7	-71.5	-71.5			-71.3					
		60		-72.1	-71.8	-71.7			-71.5					
2	n78[3]	15		-94.2	-92.7	-91.9								
		30		-94.5	-92.8	-92.1								
		60		-94.9	-93.1	-92.3								
3	n78[1,2]	15		-94.2	-92.7	-91.9	-94.2	-92.7	-91.9					
		30		-94.5	-92.8	-92.1	-94.5	-92.8	-92.1					
		60		-94.9	-93.1	-92.3	-94.9	-93.1	-92.3					
	n78[3]	15		-94.2	-92.7	-91.9								
		30		-94.5	-92.8	-92.1								
		60		-94.9	-93.1	-92.3								
8	n77[6,7] n78[6,7]	15		-84.5	-84.4	-84.2			-85.6	-85.8				
		30		-84.8	-84.5	-84.4			-85.7	-85.9	-86.0			
		60		-85.2	-84.8	-84.6			-85.9	-86.0	-86.1			
8	n79[4,5]	15							-82.8	-82.4				
		30							-82.9	-82.5	-82.3	-81.7		-81.2
		60							-83.1	-82.6	-82.4	-81.8		-81.3
18, 19	n77[4,5]	15		-84.9	-84.6	-84.4			-84.4	-84.4				
		30		-85.2	-84.7	-84.6			-84.5	-84.5	-84.4	-84.4		-84.4
		60		-85.6	-85.0	-84.8			-84.7	-84.6	-84.5	-84.5		-84.5
28	n77[4,5] n78[4,5]	15		-84.9	-84.6	-84.4			-84.4	-84.4				
		30		-85.2	-84.7	-84.6			-84.5	-84.5	-84.4	-84.4		-84.4
		60		-85.6	-85.0	-84.8			-84.7	-84.6	-84.5	-84.5		-84.5
20	n77[6,7] n78[6,7]	15		-84.5	-84.4	-84.2			-83.1					
		30		-84.8	-84.5	-84.4			-83.2					
		60		-85.2	-84.8	-84.6			-83.4					
26	n41			-84.5	-84.6	-84.4			-83.6	-83.3	3.9	3.1	2.7	
		30		-84.8	-84.7	-84.6			-83.7	-83.4	-83.0	-82.5	-82.4	
		60		-85.2	-85.0	-84.8			-83.9	-83.5	-83.2	-82.5	-82.4	
26	n77[6,7] n78[6,7]	15		-84.5	-84.4	-84.2			-83.1					
		30		-84.8	-84.5	-84.4			-83.2					
		60		-85.2	-84.8	-84.6			-83.4					
26	n77[4,5]	15		-84.9	-84.6	-84.4			-84.4	-84.4				
		30		-85.2	-84.7	-84.6			-84.5	-84.5	-84.4	-84.4	-85.6	-84.4
		60		-85.6	-85.0	-84.8			-84.7	-84.6	-84.5	-84.5	-85.7	-84.5
n28	1[8,9,10]	15	-89.1	-88.7	-88.3	-88.0								
	n75[1,2]	15	TBD	TBD	TBD	TBD								

		30	TBD	TBD	TBD	TBD								
		60	TBD	TBD	TBD	TBD								
n71	2[11]	15	-92.7	-93.3	-91.8	-90.7								
n71	2[12]	15	-95.6	-93.3	-91.8	-90.7								
66	n78[1,2]	15		-71.4	-71.4	-71.3			-71.2					
		30		-71.7	-71.5	-71.5			-71.3					
		60		-72.1	-71.8	-71.7			-71.5					
	n78[3]	15		-94.2	-92.7	-91.9								
		30		-94.5	-92.8	-92.1								
		60		-94.9	-93.1	-92.3								

NOTE 1: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the aggressor (lower) band for which the 2nd transmitter harmonic is within the downlink transmission bandwidth of a victim (higher) band.

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 with a carrier frequency at $\pm\left(20 + BW_{Channel}^{HB} / 2\right)$ MHz offset from $2 f_{UL}^{LB}$ in the victim (higher band) with $F_{UL\_low}^{LB} + BW_{Channel}^{LB} / 2 \leq f_{UL}^{LB} \leq F_{UL\_high}^{LB} - BW_{Channel}^{LB} / 2$, where and $BW_{Channel}^{HB}$ 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 5th 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 4th 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 a low band for which the 3rd transmitter harmonic is within the downlink transmission bandwidth of a high band.

NOTE 9 The requirements should be verified for UL EARFCN of a low band (superscript LB) such that 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 of a high band in MHz and the channel bandwidth configured in the low band.

NOTE 10: Applicable for the operations with 2 or 4 antenna ports supported in the band with carrier aggregation configured.

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.

7.3B.2.3.5.2 Reference sensitivity test requirement exceptions due to receiver harmonic mixing for EN-DC in NR FR1Reference sensitivity

Editor's note:Table title is missing

Table 7.3B.2.3.5.2-1:

UL band	DL band	SCS (kHz)	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	25 MHz (dBm)	40 MHz (dBm)	50 MHz (dBm)	60 MHz (dBm)	80 MHz (dBm)	90 MHz (dBm	100 MHz (dBm)
2	n71[4]	15	-70.4	-70.4	-70.4	-70.4							
		30		-70.7	-70.7	-71.8							
		60		-72.4	-72.7	-77.0							
26	n41[4]		-72.5	-69.5	-69.5	N/A							
41	n77[7]		N/A	-87.0	-85.5	-85.3	N/A	-86.1	-85.8				
			N/A	-87.3	-85.6	-85.5	N/A	-86.2	-85.9	-86.2	-85.7	-85.2	
			N/A	-87.7	-85.9	-85.7	N/A	-86.4	-86.0	-86.3	-85.8	-85.3	
41	n78[7]		N/A	-87.0	-85.5	-85.3	N/A	-86.1	-85.8				
			N/A	-87.3	-85.6	-85.5	N/A	-86.2	-85.9	-86.2	-85.7	-85.2	
			N/A	-87.7	-85.9	-85.7	N/A	-86.4	-86.0	-86.3	-85.8	-85.3	
n71	2[5]		TBD	TBD	TBD	TBD							
	2[6]		TBD	TBD	TBD	TBD							
n77	41[8]		-86.9	-83.9	-82.1	-80.9	N/A	N/A	N/A	N/A	N/A	N/A	
n77	28[2]		-69.8	-69.8	-69.8	-68.3							
n78	41[8]		-86.9	-83.9	-82.1	-80.9	N/A	N/A	N/A	N/A	N/A	N/A	
n79	19[2]		-69.8	-69.8	-69.8								
n79	21[3]		-60.0	-60.0	-60.0								
n79	26[2]		-69.8	-69.8	-69.8	N/A	N/A	N/A	N/A	N/A	N/A		N/A

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 $f_{DL}^{LB} = \lfloor f_{UL}^{HB} / 0.5 \rfloor 0.1$ in MHz and $F_{DL\_low}^{LB} + BW_{Channel}^{LB} / 2 \leq f_{DL}^{LB} \leq F_{DL\_high}^{LB} - BW_{Channel}^{LB} / 2$ with f_{DL}^{LB} carrier frequency in the victim (lower) band in MHz and the channel bandwidth configured in the lower band.

NOTE 3: The requirements should be verified for DL EARFCN of the victim (lower) band (superscript LB) such that $f_{DL}^{LB} = \lfloor f_{UL}^{HB} / 0.4 \rfloor 0.1$ in MHz and $F_{DL\_low}^{LB} + BW_{Channel}^{LB} / 2 \leq f_{DL}^{LB} \leq F_{DL\_high}^{LB} - BW_{Channel}^{LB} / 2$ with f_{DL}^{LB} carrier frequency in the victim (lower) band in MHz and the channel bandwidth configured in the lower band.

NOTE 4: The requirements should be verified for UL EARFCN of the aggressor (higher) band (superscript HB) such that $f_{DL}^{LB} = \lfloor f_{UL}^{HB} / 0.3 \rfloor 0.1$ 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 (lower) band and the channel bandwidth configured in the higher band.

NOTE 5: These requirements apply when the lower edge frequency of the 5 MHz uplink channel in Band n71 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: These requirements apply when the lower edge frequency of the 10 MHz, 15 MHz, or 20 MHz uplink channel in Band n71 is located at or below 668 MHz and the downlink channel in Band 2 is located with its upper edge at 1990 MHz.

NOTE 7: The requirements should be verified for UL EARFCN of the aggressor (lower) band (superscript LB) such that $f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.15 \rfloor 0.1$ 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: The requirements should be verified for UL EARFCN of the aggressor (higher) band (superscript HB) such that $f_{UL}^{LB} = \lfloor 15 * f_{DL}^{HB} \rfloor 0.1$ in MHz and $F_{UL\_low}^{HB} + BW_{Channel}^{HB} / 2 \leq f_{UL}^{HB} \leq f_{UL\_high}^{HB} - BW_{Channel}^{HB} / 2$ with f_{DL}^{LB} carrier frequency in the victim (lower) band in MHz and $BW_{Channel}^{LB}$ the channel bandwidth configured in the higher band.

7.3B.2.3.5.3 Reference sensitivity test requirement exceptions due to close proximity of bands for EN-DC in NR FR1

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7.3B.2.3.5.4 Reference sensitivity test requirement exceptions cross band isolation for EN-DC in NR FR1

FFS

7.3B.2.3.5.5 Reference sensitivity test requirement for intermodulation interference due to dual uplink operation for EN-DC in NR FR1

Table 7.3B.2.3.5.5-1: Reference sensitivity exceptions due to dual uplink operation for EN-DC in NR FR1 (two bands)

				NR or E-UTRA Band / Channel bandwidth						
EN-DC Configuration	**EUTRA or NR band**	**SCS (kHz)**	**5 MHz (dBm)**	**10 MHz (dBm)**	**15 MHz (dBm))**	**20 MHz (dBm)**	**40 MHz (dBm)**	**IMD order)**	**Duplex mode**
DC_1A_n77A	1	N/A	-69.5	-	-	-	-	IMD2[3]	FDD
	n77	15	-	REFSENS	-	-	-	N/A	TDD
DC_1A_n77A	1	N/A	-91.3	-	-	-	-	IMD4-	FDD
	n77	15	-	REFSENS	-	-	-	N/A	TDD
DC_2A_n66A	2	N/A	-77.3	-	-	-	-	IMD3	
	n66	15	REFSENS	-	-	-	-	N/A	
DC_2A_n66A	2	N/A	REFSENS	-	-	-	-	N/A	
	n66	15	-95.5 +TT	-	-	-	-	IMD5	
DC_2A_n78A	2	N/A	-71.3	-	-	-	-	IMD2[3]	FDD
	n78	15	-	REFSENS	-	-	-	-	TDD
DC_2A_n78A	2	N/A	-89.3	-	-	-	-	N/A	
	n78	15	-	REFSENS	-	-	-	IMD4[3]	TDD
DC_3A_n7A	3	N/A	REFSENS	-	-	-	-	-	
	n7	15	-	-84.6 +TT[5]	-	-	-	-	
DC_3A_n77A DC_3A_n78A	3	N/A	-70.3	-	-	-	-	IMD2[3]	
	n77, n78	15	-	REFSENS	-	-	-	-	TDD
DC_3A_n77A DC_3A_n78A	3	N/A	-88.3	-	-	-	-	IMD4[3]	
	n77, n78	15	-	REFSENS	-	-	-	N/A	TDD
DC_3A_n78A	3	N/A	TBD[5]	-	-	-	-	IMD2	
	n78	15	-	REFSENS	-	-	-	N/A	TDD
	3	N/A	-	-	-	-	-	N/A	No
	n78	15	-	REFSENS	-	-	-	N/A	
DC_3C_n78A	3	N/A	-70.3	-	-	-	-	IMD2[4]	
	n78	15	-	REFSENS	-	-	-	N/A	
	n78	15	-	REFSENS	-	-	-	N/A	
DC_3C_n78A	3	N/A	-88.3	-	-	-	-	IMD4[4]	
	n78	15	-	REFSENS	-	-	-	N/A	
DC_5A_n78A	5	N/A	-89.0	-	-	-	-	IMD4	FDD
	n78	15	-	REFSENS	-	-	-	N/A	TDD
DC_8A_n77A DC_8A_n78A DC_8A-SUL_n78A-n81A	8	N/A	-88.0	-	-	-	-	IMD4	FDD
	n77, n78	15	-	REFSENS	-	-	-	H4	TDD
DC_8A_n79A DC_8A-SUL_n79A-n81A	8	N/A	-91.5	-	-	-	-	IMD5	FDD
	n79	15	-	-	-	-	REFSENS	N/A	TDD
DC_20A_n77A	20	N/A	-85.3	-	-	-	-	IMD4	FDD
	n77	15	-	REFSENS	-	-	-	N/A	TDD
	20	N/A	-89.8	-	-	-	-	IMD5	FDD
	n77	15	-	REFSENS	-	-	-	N/A	TDD
DC_20A_n78A, DC_20A-SUL_n78A-n82A	20	N/A	-74.6	-	-	-	-	IMD4[4]	FDD
	n78	15	-	REFSENS	-	-	-	N/A	TDD
DC_21A_n79A	21	N/A	-80.9	-	-	-	-	IMD3	FDD
	n79	15	-	-	-	-	REFSENS	N/A	TDD
CA_28A_n77A, CA_28A_n78A, DC_28A-SUL_n78A-n83A	28	N/A	-92.3	-	-	-	-	IMD5	FDD
	n77, n78	15	-	REFSENS	-	-	-	N/A	TDD
DC_66A_n78A	66	1740	-72.8	-	-	-	-	IMD2[3]	FDD

	n78	3575	-	REFSENS	-	-	-	N/A	TDD
	66	1765	-90.8	-	-	-	-	IMD4[3]	FDD
	n78	3435	-	REFSENS	-	-	-	N/A	TDD

NOTE 1: Both of the transmitters shall be set min(+20 dBm, $P_{CMAX\_L,c}$) as defined in subclause 6.2.5A. In case Single UL is allowed and the UE only indicates support of "Single UL" the output power of the active UL shall be set at $P_{CMAX\_L,c}$ or set to the maximum output power according to the UE power scaling capability.
NOTE 2: RB_{START} = 0
NOTE 3: This band is subject to IMD5 also which MSD is not specified.
NOTE 4: The symbol "REFSENS" in this table refers to the reference sensitivity values for single carrier specified in Table 7.3.5-2 of TS36.521-1 for 2 antenna port E-UTRA band, Table 7.3_1.5-1 of TS 36.521-1 for 4 antenna port E-UTRA band, Table 7.3.2.5-1 for 2 antenna port NR band and Table 7.3.2_1.5-1 for 4 antenna port NR band.
NOTE 5: For UEs only indicating support of Single UL, this requirement is verified with non-simultaneous uplink transmissions on the E-UTRA and NR CGs.

Table 7.3B.2.3.5.5-2: Reference sensitivity exceptions for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

EN-DC Configuration	EUTRA/ NR band	SCS (kHz)	5 MHz (dBm)	10 MHz (dBm)	20 MHz (dBm)	40 MHz (dBm)	Duplex mode	IMD order	Single UL allowed
DC_1A-3A_n77A	1	N/A	REFSENS	-	-	-	FDD	N/A	
	3	N/A	-64.8	-	-	-		IMD2	
	n77	15	-	REFSENS	-	-	TDD	N/A	
	1	N/A	REFSENS	-	-	-	FDD	N/A	
	3	N/A	-87.8	-	-	-		IMD4	
	n77	15	-	REFSENS	-	-	TDD	N/A	
	1	N/A	-68.3	-	-	-	FDD	IMD2	
	3	N/A	REFSENS	-	-	-		N/A	
	n77	15	-	REFSENS	-	-	TDD	N/A	
DC_1A-3A_n78A DC_1A-3C_n78A	1	N/A	-91.0	-	-	-	FDD	IMD4 $\|f_{B78}-3*f_{B1}\|$	
	3	N/A	REFSENS	-	-	-	FDD	N/A	
	n78	15	-	REFSENS	-	-	TDD	N/A	
	1	N/A	REFSENS	-	-	-	FDD	N/A	
	3	N/A	-65.1	-	-	-		IMD2 $\|f_{B78}-f_{B1}\|$	
	n78	15	-	REFSENS	-	-	TDD	N/A	
	1	N/A	-96.5	-	-	-	FDD	IMD5 $\|2*f_{B78}-3*f_{B3}\|$	
	3	N/A	REFSENS	-	-	-		N/A	
	n78	15	-	REFSENS	-	-	TDD	N/A	
DC_1A-5A_n78A	1	N/A	-91.0	-	-	-	FDD	IMD4 $\|f_{B78}-3*f_{B1}\|$	
	5	N/A	REFSENS	-	-	-	FDD	N/A	
	n78	15	-	REFSENS	-	-	TDD	N/A	
	1	N/A	REFSENS	-	-	-	FDD	N/A	
	5	N/A	-89.0	-	-	-	FDD	IMD4 $\|f_{B78}-3*f_{B5}\|$	
	n78	15	-	REFSENS	-	-	TDD	N/A	
	1	N/A	-81.2	-	-	-	FDD	IMD3 $\|f_{B78}-2*f_{B5}\|$	
	5	N/A	REFSENS	-	-	-	FDD	N/A	
	n78	15	-	REFSENS	-	-	TDD	N/A	
	1	N/A	REFSENS	-	-	-	FDD	N/A	
	5	N/A	-94.2	-	-	-	FDD	IMD5 $\|2*f_{B78}-3*f_{B1}\|$	
	n78	15	-	REFSENS	-	-	TDD	N/A	

EN-DC Configuration	EUTRA/ NR band	SCS (kHz)	5 MHz (dBm)	10 MHz (dBm)	20 MHz (dBm)	40 MHz (dBm)	Duplex mode	IMD order	Single UL allowed
DC_1A-7A_n78A	1	N/A	-91.0	-	-	-	FDD	IMD4 $\|f_{B78}-3*f_{B1}\|$	
	7	N/A	REFSENS	-	-	-	FDD	N/A	
	n78	15	-	REFSENS	-	-	TDD	N/A	
	1	N/A	REFSENS	-	-	-	FDD	N/A	
	7	N/A	-88.2	-	-	-	FDD	IMD4 $\|f_{B78}-3*f_{B1}\|$	
	n78	15	-	REFSENS	-	-	TDD	N/A	
	1	N/A	-90.6	-	-	-	FDD	IMD4 $\|2*f_{B78}-2*f_{B7}\|$	
	7	N/A	REFSENS	-	-	-	FDD	N/A	
	n78	15	-	REFSENS	-	-	TDD	N/A	
DC_1A-20A_n78A	1	N/A	-79.0	-	-	-	FDD	IMD3	
	20	N/A	REFSENS	-	-	-	FDD	N/A	
	n78	15	-	REFSENS	-	-	TDD	N/A	
DC_1A-20A_n78A	1	N/A	REFSENS	-	-	-	FDD	N/A	
	20	N/A	-93.3	-	-	-	FDD	IMD5	
	n78	15	-	REFSENS	-	-	TDD	N/A	
DC_3A-5A_n78A	3	N/A	REFSENS	-	-	-	FDD	N/A	
	5	N/A	-89.0	-	-	-	FDD	IMD4 $\|f_{B78}-3*f_{B5}\|^4$	
	n78	15	-	REFSENS	-	-	TDD	N/A	
	3	N/A	-70.3	-	-	-	FDD	IMD2 $\|f_{B78}-f_{B3}\|$	
	5	N/A	REFSENS	-	-	-	FDD	N/A	
	n78	15	-	REFSENS	-	-	TDD	N/A	
	n78	15	-	REFSENS	-	-	TDD	N/A	
	3	N/A	-88.3	-	-	-	FDD	IMD4 $\|f_{B78}-3*f_{B3}\|^4$	
			[TBD]			10.7^5			
DC_3C-7C_n78A	3	N/A	-78.7	-	-	-	FDD	IMD3 $\|f_{B78}-2*f_{B7}\|$	
	7	N/A	REFSENS	-	-	-	FDD	N/A	
	n78	15	-	REFSENS	-	-	TDD	N/A	
	3	N/A	-87.7	-	-	-	FDD	IMD4 $\|2*f_{B78}-2*f_{B7}\|$	
	7	N/A	REFSENS	-	-	-	FDD	N/A	

EN-DC Configuration	EUTRA/ NR band	SCS (kHz)	5 MHz (dBm)	10 MHz (dBm)	20 MHz (dBm)	40 MHz (dBm)	Duplex mode	IMD order	Single UL allowed
	n78	15	-	REFSENS	-	-	TDD	N/A	
DC_3A-7A_n78A DC_3C-7A_n78A	3	N/A	-78.7	-	-	-	FDD	IMD3 $\|f_{B78}-2*f_{B7}\|$	
	7	N/A	REFSENS	-	-	-	FDD	N/A	
	n78	15	-	REFSENS	-	-	TDD	N/A	
DC_3A-7A_n78A DC_3C-7A_n78A	3	N/A	-87.7	-	-	-	FDD	IMD4 $\|2*f_{B78}-2*f_{B7}\|$	
	7	N/A	REFSENS	-	-	-	FDD	N/A	
	n78	15	-	REFSENS	-	-	TDD	N/A	
DC_3A-20A_n78A DC_3C-20A_n78A	3	N/A	-79.0	-	-	-	FDD	IMD3 $\|f_{B78}-2*f_{B20}\|$	
	20	N/A	REFSENS	-	-	-	FDD	N/A	
	n78	15	-	REFSENS	-	-	TDD	N/A	
DC_5A-7A_n78A	5	N/A	-89.0	-	-	-	FDD	IMD4 $\|f_{B78}-3*f_{B5}\|$	
	7	N/A	REFSENS	-	-	-	FDD	N/A	
	n78	15	-	REFSENS	-	-	TDD	N/A	
	5	N/A	REFSENS	-	-	-	FDD	N/A	
	7	N/A	-67.2	-	-	-	FDD	N/A	
	n78	15	-	REFSENS	-	-	TDD	N/A	
	5	N/A	-67.1	-	-	-	FDD	IMD2 $\|f_{B78}-f_{B7}\|$	
	7	N/A	REFSENS	-	-	-	FDD	N/A	
	n78	15	-	REFSENS	-	-	TDD	N/A	
	5	N/A	-94.0	-	-	-	FDD	IMD5 $\|2*f_{B78}-3f_{B7}\|$	
	7	N/A	REFSENS	-	-	-	FDD	N/A	
	n78	15	-	REFSENS	-	-	TDD	N/A	
DC_7A-20A_n78A	7	N/A	REFSENS	-	-	-	FDD	N/A	
	20	N/A	-65.8	-	-	-	FDD	IMD2 $\|f_{B78}-f_{B7}\|$	
	n78	3370	-	REFSENS	-	-	TDD	N/A	
DC_7A-20A_n78A	7	N/A	REFSENS	-	-	-	FDD	N/A	
	20	N/A	-93.3	-	-	-	FDD	IMD5 $\|2*f_{B78}-3*f_{B7}\|$	
	n78	15	-	REFSENS	-	-	TDD	N/A	

EN-DC Configuration	EUTRA/ NR band	SCS (kHz)	5 MHz (dBm)	10 MHz (dBm)	20 MHz (dBm)	40 MHz (dBm)	Duplex mode	IMD order	Single UL allowed
DC_7A-20A_n78A	7	N/A	-66.5	-	-	-	FDD	IMD2 $\|f_{B78}-f_{B20}\|$	
	20	N/A	REFSENS	-	-	-	FDD	N/A	
	n78	15	-	REFSENS	-	-	TDD	N/A	
DC_7A-28A_n78A	7	N/A	REFSENS	-	-	-	FDD	N/A	
	28	N/A	-89.5	-	-	-		IMD2	
	n78	15	-	REFSENS	-	-	TDD	N/A	
	7	N/A	REFSENS	-	-	-	FDD	N/A	
	28	N/A	-94.8	-	-	-		IMD5	
	n78	15	-	REFSENS	-	-	TDD	N/A	
	7	N/A	-66.8	-	-	-	FDD	IMD2	
	28	N/A	REFSENS	-	-	-		N/A	
	n78	15	-	REFSENS	-	-	TDD	N/A	

NOTE 1: Both of the transmitters shall be set min (+20 dBm, $P_{CMAX\_L,c}$) as defined in subclause 6.2.5A. In case Single UL is allowed and the UE only indicates support of "Single UL" the output power of the active UL shall be set at $P_{CMAX\_L,c}$ or set to the maximum output power according to the UE power scaling capability.
NOTE 2: RB_{START} = 0
NOTE 3: For UEs only indicating support of Single UL, this requirement is verified with non-simultaneous uplink transmissions on the E-UTRA and NR CGs.
NOTE 4: This band is subject to IMD5 also which MSD is not specified.
NOTE 5: The symbol "REFSENS" in this table refers to the reference sensitivity values for single carrier specified in Table 7.3.5-2 of TS36.521-1 for 2 antenna port E-UTRA band, Table 7.3_1.5-1 of TS 36.521-1 for 4 antenna port E-UTRA band, Table 7.3.2.5-1 for 2 antenna port NR band and Table 7.3.2_1.5-1 for 4 antenna port NR band.
NOTE 6: No requirements apply when there is at least one individual RE within the intermodulation generated by the dual uplink is within the downlink transmission bandwidth of the Band 46. The reference sensitivity should only be verified when this is not the case (the requirements for Band 46 specified in the CA_7A-46A in clause 7.3.1 of 36.101 apply).

Table 7.3B.2.3.5.5-3: Reference sensitivity exceptions due to Tx leakage issue (three bands)

FFS

For the UE which supports inter-band EN-DC, the minimum requirement for reference sensitivity in Table 7.3.2.5-1 of TS 38.521-1 [8] for NR band and Table 7.3.5-1 of TS 36.521-1 [10] for EUTRA band, shall be increased by the amount given in $\Delta R_{IB,c}$ defined in subclause 7.3B.3.3 for the applicable for two, three, four and five bands operation.

7.3B.2.4 Reference sensitivity for Inter-band EN-DC including FR2

7.3B.2.4.1 Test purpose

Same test purpose as in clause 7.3.2.1 in TS 38.521-2 [9] for the NR carrier.

7.3B.2.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC.

7.3B.2.4.3 Minimum conformance requirements

Same minimum conformance requirements as in clause 7.3.2.3 in TS 38.521-2 [9] for the NR carrier.

The normative reference for this requirement is TS 38.101-3 [4] subclause 6.3B.2.4.

7.3B.2.4.4 Test description

7.3B.2.4.4.1 Initial conditions

Same test description as in clause 7.3.2.4 in TS 38.521-2 [9] for the NR carrier with the following exception:

The initial test configurations for E-UTRA band consist of environmental conditions, test frequencies, and channel bandwidths based on E-UTRA bands specified in Table 4.6-1. For Initial conditions as in clause 7.3.2.4.1 in TS 38.521-2 [9], the following steps will be added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.7-1 and propagation conditions are set according to Annex B.0 of TS36.521-1 [10].

Step 6 of Initial conditions as in clause 7.3.2.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

Same test procedure as in clause 6.5.3.1.4.1 in TS 38.521-2 [9] with the following steps added for E-UTRA component:

1.1 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.7-1 under clause 4.7.

7.3B.2.4.5 Test requirement

Same test requirement as in clause 7.3.2.5 in TS 38.521-2 [9] for the NR carrier.

7.3B.3 $\Delta R_{IB,c}$ ΔR_{IBNC} for EN-DC

Editor's Note: ΔRIB,c for Intra-band Contiguous EN-DC is FFS

For the UE which supports inter-band EN-DC configuration, the minimum requirement for reference sensitivity in Table 7.3.5-1 in TS 36.521-1 [10] for a E-UTRA carrier, Tables 7.3.2.5-1 in TS 38.521-1 [8] for NR carrier shall be increased by the amount given in $\Delta R_{IB,c}$ ΔR_{IBNC} in Tables below where unless otherwise stated, the same $\Delta R_{IB,c}$, ΔR_{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 ΔR_{IBNC} is set to zero.

7.3B.3.1 Reference sensitivity $\Delta R_{IB,c}$ for Intra-band Contiguous EN-DC

FFS

7.3B.3.2 Reference sensitivity $\Delta R_{IB,c}$ for Intra-band non-contiguous EN-DC

Table 7.3B.3.2-1: Intra-band non-contiguous EN-DC with one uplink configuration for reference sensitivity

DC configuration	Aggregated channel bandwidth (LTE+NR)	W_{gap} / (MHz)	UL LTE allocation	ΔR_{IBNC} (dB)	Duplex mode
DC_3A_n3A	5MHz+5MHz	$45.0 < W_{gap} \le 65.0$	12[1]	4.7	FDD
		$0.0 < W_{gap} \le 45.0$	25[1]	0	
	5MHz+10MHz	$40.0 < W_{gap} \le 60.0$	12[1]	3.8	
		$0.0 < W_{gap} \le 40.0$	25[1]	0	
	5MHz+15MHz	$35.0 < W_{gap} \le 55.0$	12[1]	3.6	
		$0.0 < W_{gap} \le 35.0$	25[1]	0	
	5MHz+20MHz	$30.0 < W_{gap} \le 50.0$	12[1]	3.4	
		$0.0 < W_{gap} \le 30.0$	25[1]	0	
	5MHz+25MHz	$25.0 < W_{gap} \le 45.0$	12[1]	3.2	
		$0.0 < W_{gap} \le 25.0$	25[1]	0	
	5MHz+30MHz	$20.0 < W_{gap} \le 40.0$	12[1]	3.0	
		$0.0 < W_{gap} \le 20.0$	25[1]	0	
	10MHz+5MHz	$30.0 < W_{gap} \le 60.0$	12[5]	5.1	
		$0.0 < W_{gap} \le 30.0$	32[1]	0	
	10MHz+10MHz	$25.0 < W_{gap} \le 55.0$	12[5]	4.3	
		$0.0 < W_{gap} \le 25.0$	32[1]	0	
	10MHz+15MHz	$20.0 < W_{gap} \le 50.0$	12[5]	3.8	
		$0.0 < W_{gap} \le 20.0$	32[1]	0	
	10MHz+20MHz	$15.0 < W_{gap} \le 45.0$	12[5]	3.5	
		$0.0 < W_{gap} \le 15.0$	32[1]	0	
	10MHz+25MHz	$10.0 < W_{gap} \le 40.0$	12[5]	3.2	
		$0.0 < W_{gap} \le 10.0$	32[1]	0	
	10MHz+30MHz	$5.0 < W_{gap} \le 35.0$	12[5]	2.8	
		$0.0 < W_{gap} \le 5.0$	32[1]	0	
	15MHz+5MHz	$25.0 < W_{gap} \le 55.0$	12[6]	6.0	
		$0.0 < W_{gap} \le 25.0$	32[1]	0	
	15MHz+10MHz	$20.0 < W_{gap} \le 50.0$	12[6]	4.7	
		$0.0 < W_{gap} \le 20.0$	32[1]	0	
	15MHz+15MHz	$15.0 < W_{gap} \le 45.0$	12[6]	4.2	
		$0.0 < W_{gap} \le 15.0$	32[1]	0	
	15MHz+20MHz	$10.0 < W_{gap} \le 40.0$	12[6]	3.8	
		$0.0 < W_{gap} \le 10.0$	32[1]	0	
	15MHz+25MHz	$5.0 < W_{gap} \le 35.0$	12[6]	3.5	
		$0.0 < W_{gap} \le 5.0$	32[1]	0	
	15MHz+30MHz	$0.0 < W_{gap} \le 30.0$	12[6]	3.3	
	20MHz+5MHz	$15.0 < W_{gap} \le 50.0$	16[7]	6.5	
		$0.0 < W_{gap} \le 15.0$	32[1]	0	
	20MHz+10MHz	$10.0 < W_{gap} \le 45.0$	16[7]	5.1	
		$0.0 < W_{gap} \le 10.0$	32[1]	0	
	20MHz+15MHz	$5.0 < W_{gap} \le 40.0$	16[7]	4.5	
		$0.0 < W_{gap} \le 5.0$	32[1]	0	
	20MHz+20MHz	$0.0 < W_{gap} \le 35.0$	16[7]	4.1	
	20MHz+25MHz	$0.0 < W_{gap} \le 30.0$	16[7]	3.8	
	20MHz+30MHz	$0.0 < W_{gap} \le 25.0$	16[7]	3.6	

NOTE 1: [1] refers to the 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 carrier centre frequency of PCC in the UL operating band is configured closer to the DL operating band.
NOTE 4: All combinations of channel bandwidths defined in Table 5.3B.1.3-1.
NOTE 5: [5] refers to the UL resource blocks shall be located at RB_{start}=25.
NOTE 6: [6] refers to the UL resource blocks shall be located at RB_{start}=35.
NOTE 7: [7] refers to the UL resource blocks shall be located at RB_{start}=50.

7.3B.3.3 $\Delta R_{IB,c}$ for Inter-band EN-DC within FR1

7.3B.3.3.1 $\Delta R_{IB,c}$ for Inter-band EN-DC in two bands within FR1

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	n78	0.5
DC_7_n78	n78	0.5
DC_8_n77	3	0.2
	n77	0.5
DC_8_n78	3	0.2
	n78	0.5
DC_11_n77	n77	0.5
DC_11_n78	n78	0.5
DC_12A_n5A	12	0.3
	n5	0.5
DC_12A_n66A	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^{f}
		0.5^{2}
DC_26A_n77A	n77	0.5
DC_26_n78	n78	0.5
DC_28A_n51	n51	0.2
DC_28_n77	28	0.2
	n77	0.5
DC_28_n78	28	0.2
	n78	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_66A_n78A	66	0.2
	n78	0.5

NOTE 1: The requirement is applied for UE transmitting on the frequency range of 2545-2690MHz. NOTE 2: The requirement is applied for UE transmitting on the frequency range of 2496-2545MHz.

7.3B.3.3.2 $\Delta R_{IB,c}$ for Inter-band EN-DC in three bands within FR1

Table 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	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	1	0.0
	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	0.2
	n78	0.5
DC_1_n28-n78	1	0
	n28	0.2
	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
	n79	0.0
DC_1_n78-n79	1	0.0
	n78	0.5
	n79	0.0
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_3-19_n79	3	0
	19	0
	n79	0
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
	n78	0.5
DC_3_n28-n78	3	0.2
	n28	0
	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[1]
		0.5[2]
	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
	n79	0
DC_3_n77-n79	3	0.2
	n77	0.5
	n79	0.0
DC_3_n78-n79	3	0.2
	n78	0.5
	n79	0.0
DC_3-SUL_n78-n80	3	0.2
	n78	0.5
	n80	0.2
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_7-7_n78	7	0.0
	n78	0.5
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
	n81	0.2
DC_18-28_n77	n77	0.5
	n78	0.5
	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	19	0.0
	n77	0.5
	N79	0
DDC_19_n78-n79	19	0.0
	N78	0.5
	n79	0.0
DC_20_n8-n75	20	0.0
	n8	0.0
	n75	0.0
DC_20_n28-n75	20	0.0
	n28	0.2
	n75	0.0
DC_20_n28-n78	20	0.2
	n28	0.2
	n78	0.5
DC_20_n75-n78	20	0.0
	n75	0.0
	n78	0.5
DC_20_n76-n78	20	0.0
	n76	0.0
	n78	0.5
DC_20-SUL_n78-n82	n78	0.5
DC_20-SUL_n78-n83	20	0.2
	n78	0.5
	n83	0.2
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	21	0.0
	n77	0.5
	n79	0.0
DC_21_n78-n79	21	0.0
	n78	0.5
	n79	0.0
DC_28-SUL_n78-n83	28	0.2
	n78	0.5
	n83	0.2
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_41_n77	n77	0.5
DC_41_n78	n78	0.5
DC_41_n79	n79	0.5
DC_66-SUL_n78-n86	66	0.2
	n78	0.5
	n86	0.2
NOTE 1: The requirement is applied for UE transmitting on the frequency range of 2545-2690MHz. NOTE 2: The requirement is applied for UE transmitting on the frequency range of 2496-2545MHz.		

7.3B.3.3.3 $\Delta R_{IB,c}$ for Inter-band EN-DC in four bands within FR1

Table 7.3B.3.3.3-1: ΔRIB,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 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_1-3-28_n77	1	0.2
	3	0.2
	28	0.2
	n77	0.5
DC_1-3-28_n78 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_1-3-19_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_1-3-42_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 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	1	0.0
	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_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 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	0.2	0.2
	0.5	0.5

	0.5	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	7	0.0
	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 Inter-band EN-DC in five bands within FR1

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, 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_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
	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
	n79	0.0
DC_1-7-20_n28-n78 DC	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 DC	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 Inter-band EN-DC six bands within FR1

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.3.4 Reference sensitivity for $\Delta R_{IB,c}$ Inter-band EN-DC including FR2

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7.3B.3.4.1 Reference sensitivity for $\Delta R_{IB,c}$ Inter-band EN-DC in two bands including FR2

Table 7.3B.3.4.1-1: $\Delta R_{IB,c}$ due to EN-DC(two bands)

Inter-band EN-DC configuration	E-UTRA or NR Band	$\Delta R_{IB,c}$ (dB)

7.3B.3.4.2 Reference sensitivity for $\Delta R_{IB,c}$ Inter-band EN-DC in three bands including FR2

Table 7.3B.3.4.2-1: $\Delta R_{IB,c}$ due to EN-DC (three bands)

Inter-band EN-DC configuration	E-UTRA or NR Band	$\Delta R_{IB,c}$ (dB)
DC_1-18_n257	1	0.3
	18	0.3
DC_1-28_n257	28	0.2
DC_1-41_n257	1	0.5
	41	0.5
DC_1-42_n257	1	0
	42	0.5
DC_1-77_n257	1	0.2
	n77	0.5
DC_1-78_n257	1	0
	n78	0.5
DC_1-79_n257	1	0.0
	n79	0.0
DC_2-66_n257	2	0.3
	66	0.3
DC_3-21_n257	3	0.3
	21	0.5
DC_3-28_n257	n257	0.5
DC_3-41_n257	41	0[1]/0.5[2]
DC_3-42_n257	3	0.2
	42	0.5
DC_3-77_n257	3	0.2
	n77	0.5
DC_3-78_n257	3	0.2
	n78	0.5
DC_3-79_n257	3	0.0
	n79	0.0
DC_5_n78-n257	5	0.2
	n78	0.5
DC_7_n78-n257	7	0
	n78	0.5
DC_13-66_n260	13	0.3
	66	0.3
DC_19-42_n257	42	0.5
DC_19-77_n257	19	0.0
	n77	0.5
DC_19-78_n257	19	0.0
	n78	0.5
DC_19-79_n257	19	0.0
	n79	0.0
DC_21-42_n257	42	0.5
DC_21-77_n257	21	0.0
	n77	0.5
DC_21-78_n257	21	0.0
	n78	0.5
DC_21-79_n257	21	0.0
	n79	0.0
DC_28-42_n257	28	0.2
	42	0.5
DC_41-42_n257	42	0.5
NOTE 1: The requirement is applied for UE transmitting on the frequency range of 2545-2690MHz. NOTE 2: The requirement is applied for UE transmitting on the frequency range of 2496-2545MHz.		

7.3B.3.4.3 Reference sensitivity for $\Delta R_{IB,c}$ Inter-band EN-DC in four bands including FR2

Table 7.3B.3.4.3-1: $\Delta R_{IB,c}$ due to EN-DC (four bands)

Inter-band EN-DC configuration	E-UTRA or NR Band	$\Delta R_{IB,c}$ (dB)
DC_1-3-21_n257		
	3	0.3
	21	0.5
DC_1-3-28_n257	1	0.2
	3	0.2
	28	0.2
DC_1-3-42_n257	1	0.2
	3	0.2
	42	0.5
DC_1-3_n78-n257	1	0.2
	3	0.2
	n78	0.5
DC_1-5_n78-n257	1	0.2
	5	0.2
	n78	0.5
DC_1-7_n78-n257	1	0.2
	7	0.2
	n78	0.5
DC_1-19-42_n257	42	0.5
DC_1-21-28_n257	28	0.2
DC_1-21-42_n257	42	0.5
DC_1-28-42_n257	28	0.2
DC_1-41-42_n257	42	0.5
DC_3-5_n78-n257	3	0.2
	5	0.2
	n78	0.5
DC_3-7_n78-n257	3	0.2
	7	0.2
	n78	0.5
DC_19-21-42_n257	42	0.5
DC_3-19-21_n257	3	0.3
	21	0.5
DC_3-19-42_n257	3	0.2
	42	0.5
DC_3-21-42_n257	3	0.3
	21	0.5
	42	0.5
DC_3-28-42_n257	3	0.2
	28	0.2
	42	0.5
DC_5-7_n78-n257	5	0.2
	7	0.2
	n78	0.5
DC_7-7_n78-n257	n78	0.5
DC_21-28-42_n257	28	0.2
	42	0.5

7.3B.3.4.4 Reference sensitivity for $\Delta R_{IB,c}$ Inter-band EN-DC in five bands including FR2

Table 7.3B.3.4.4-1: $\Delta R_{IB,c}$ 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_n78-n257	1	0.2
	3	0.2
	5	0.2
	n78	0.5
DC_1-3-7_n78-n257	1	0.3
	3	0.3
	7	0.3
	n78	0.5
DC_1-3-19-21_n257	3	0.3
	21	0.5
DC_1-3-19-42_n257	1	0.2
	3	0.2
	42	0.5
DC_1-3-21-42_n257	1	0.2
	3	0.3
	21	0.5
	42	0.5
DC_1-3-28-42_n257	1	0.2
	3	0.2
	28	0.2
	42	0.5
DC_1A-3A-28A-42C_n257A	1	0.2
	3	0.2
	28	0.2
	42	0.5
DC_1-5-7_n78-n257	1	0.2
	5	0.2
	7	0.2
	n78	0.5
DC_1-7-7_n78-n257	1	0.2
	7	0.2
	n78	0.5
DC_1-19-21-42_n257	42	0.5
DC_1-21-28-42_n257	28	0.2
	42	0.5
DC_3-5-7_n78-n257	3	0.2
	5	0.2
	7	0.2
	n78	0.5
DC_3-7-7_n78-n257	3	0.2
	7	0.2
	n78	0.5
DC_5-7-7_n78-n257	5	0.2
	7	0.2
	n78	0.5

7.3B.3.4.5 ΔRIB,c for EN-DC six bands

Table 7.3B.3.4.5-1: ΔRIB,c due to EN-DC (six bands)

Inter-band EN-DC configuration	E-UTRA or NR Band	$\Delta R_{IB,c}$ (dB)
DC_1-3-5-7_n78-n257	1	0.2
	3	0.2
	5	0.2
	7	0.2
	n78	0.5
DC_1-3-7-7_n78-n257	1	0.3
	3	0.3
	7	0.3
	n78	0.5
DC_1-5-7-7_n78-n257	1	0.2
	5	0.2
	7	0.2
	n78	0.5
DC_3-5-7-7_n78-n257	3	0.2
	5	0.2
	7	0.2
	n78	0.5

7.4 Maximum Input Level

7.4B Maximum Input Level for EN-DC

7.4B.0 Minimum conformance requirement

7.4B.0.1 Intra-band contiguous EN-DC in FR1

Intra-band contiguous EN-DC maximum input level requirement and parameters are defined in Table 7.4B.0.1-1.

Table 7.4B.0.1-1: Maximum Input

Power in Largest CC, E-UTRA or NR, dBm	X^1
Power in each other CC, dBm	$X^1 - 10*\log10(N_x SCS_x/N_y SCS_y)$
NOTE 1: Power in Largest E-UTRA or NR bandwidth CC, listed in Table 7.4-1 [2] NOTE 2: N_x, SCS_x is the number of RB's and Sub carrier spacing in the largest carrier bandwidth and could be LTE or NR carrier NOTE 3: N_y, SCS_y is the number of RB's in any other carrier. NOTE 4: For NR carrier, the transmitter shall be set to 4dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3.2-3 [2] with P_{CMAX_L} as defined in subclause 6.2B.4. NOTE 5: For E-UTRA carrier, the transmitter shall be set to 4dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3.1-2 [5] with P_{CMAX_L} as defined in subclause 6.2B.4.	

7.4B.0.2 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 sub-clause 7.4.1 for single carrier operation and in sub-clause 7.4.1A for CA in [5].

For the NR sub-block, the requirement is defined in sub-clause 7.4 in [2].

7.4B.0.3 Inter-band EN-DC within FR1

Maximum input level requirement for E-UTRA single carrier and CA operation specified in sub-clauses 7.4.1 and 7.4.1A of [5] and for NR single carrier and CA operation specified in sub-clauses 7.4 and 7.4A of [2] apply.

7.4B.0.4 Inter-band EN-DC including FR2

Maximum input level requirement for E-UTRA single carrier and CA operation specified in sub-clauses 7.4.1 and 7.4.1A of [5] and for NR single carrier and CA operation specified in sub-clauses 7.4 and 7.4A of [3] apply.

7.4B.0.5 Inter-band EN-DC including both FR1 and FR2

Maximum input level requirement for E-UTRA single carrier and CA operation specified in sub-clauses 7.4.1 and 7.4.1A of [5] and for NR single carrier and CA operation specified in sub-clauses 7.4 and 7.4A of [2] and [3] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.4B.

7.4B.1 Maximum Input Level for Intra-Band Contiguous EN-DC (2 CCs)

Editor's note: The following aspects are either missing or not yet determined:

- Message contents for Pcmax is incomplete.

7.4B.1.1 Test purpose

Maximum input level for intra-band contiguous EN-DC tests the UE's ability to receive data with a given average throughput for a specified reference measurement channel, under conditions of high signal level, ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area near to an e-NodeB or a gNB.

7.4B.1.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC operating in FR1.

7.4B.1.3 Minimum conformance requirements

Refer to Clause 7.4B.0.1 for the intra-band contiguous EN-DC maximum input level requirement.

Exception requirements are defined for this test, therefore LTE agnostic approach is not applied, E-UTRA test point analysis is included and E-UTRA measurements are performed.

The normative reference for this requirement is TS 38.101-3 [4] Clause 7.4B.1

7.4B.1.4 Test Description

7.4B.1.4.1 Initial Condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.2B.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2.All of these configurations shall be tested with applicable test parameters for each intra-band contiguous EN-DC configuration specified in clause 5.3B.1.2, and are shown in table 7.4B.3.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2.for E-UTRA RMC for TDD, TS 36.521-1 [10] Annex A.2 for E-UTRA RMC for FDD , and TS 38.521-1 [8] Annex A.2 for NR RMC Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 7.4B.1.4.1-1: Test configuration table

Initial Conditions								
Test Environment as specified in TS 38.508-1 [6] subclause 4.1					Normal			
Test Frequencies as specified in TS 38.508-1 [6] subclause 4.3.1					Mid range			
Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE					Lowest, Mid, Highest			
Test SCS for the NR cell as specified in 38.521-1 [8] Table 5.3.5-1					Lowest			
Test Parameters for Intra-band Contiguous EN-DC Configuration								
Downlink Configuration					**Uplink Configuration**			
Test ID	**NR Modulation**	**NR RB allocation**	**E-UTRA Modulation**	**E-UTRA RB allocation**	**NR Modulation**	**NR RB allocation**	**E-UTRA Modulation**	**E-UTRA RB allocation**
1	CP-OFDM 64QAM	Full RB (NOTE 1)	CP-OFDM 64QAM	Full RB	DFT-s-OFDM QPSK	NOTE 2	QPSK	NOTE 3
2	CP-OFDM 256QAM	Full RB (NOTE 1)	CP-OFDM 256QAM	Full RB	DFT-s-OFDM QPSK	NOTE 2	QPSK	NOTE 3
NOTE 1: Full RB allocation shall be used per each SCS and channel BW as specified in Table 7.3.2.4.1-2 of TS 38.521-1[8]. NOTE 2: Same RB allocation shall be used per each SCS and channel BW as specified in Table 7.3.2.4.1-2 of TS 38.521-1[8]. NOTE 3: Same RB allocation shall be used per the E-UTRA band and channel BW as specified in Table 7.3.3-2 of TS 36.521[10].								

1. Connect the SS to the UE antenna connectors as shown in [6] TS 38.508-1 A.3.1.1 for SS diagram and A.3.2.1 for UE diagram.

2. The parameter settings for the E-UTRA cell are set up according to TS 36.508[11] subclause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] subclause 4.4.3.

3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0, C.1,C.2,C3.1 and TS 38.521-1 [8] Annex C.0,C.1,C.2,C3.1for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H.0,H.1,H.2,H.3.1 and TS 38.521-1 [8] Annex G.0,G.1,G.2,G.3.1 for E-UTRA CG and NR CG respectively.

4. The UL Reference Measurement channels are TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.

5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 7.4B.1.4.3.

7.4B.1.4.2 Test Procedure

1. SS transmits PDSCH via PDCCH DCI format 1A and PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Tables 7.4B.1.4.1 on the E-UTRA CC and NR CC, The SS sends downlink MAC padding bits on the DL RMC.

2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC according to Table 7.4B.1.4.1-1on the E-UTRA CC and NR CC. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

3. SS sets the Downlink signal level for the E-UTRA CC and NR CC to the value defined in Table 7.4B.1.5-1. SS sends continuously uplink power control "up" commands to the UE for the E-UTRA CC and NR CC untilthe E-

UTRA CC andNR CC output power are within $-P_W \pm P_W$ dB of target level in Table 7.4B.1.5-1, P_W is the power window according to Table 7.4B.1.4.2-1 for the carrier frequency f and the channel bandwidth BW.

4. Measure the average throughput for each component carrier for duration sufficient to achieve statistical significance according to Annex H in TS 38.521-1 [8].

Table 7.4B.1.4.2-1: Power Window (dB) for Maximum input level

	f ≤ 3GHz	3GHz < f ≤ 4.2GHz	4.2GHz < f ≤ 6GHz
BW ≤ 20MHz	1.4	1.7	2
20MHz < BW ≤ 40MHz	1.4	1.7	2.2
40MHz < BW ≤ 100MHz	2.1	2.3	2.3

7.4B.1.4.3 Message Contents

Message contents are according to TS 38.508-1 [6] subclause 4.6.1.

7.4B.1.5 Test Requirement

For the NR CC, the throughput measurement of the carrier derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels with parameters specified in Table 7.4B.1.5-1

Table 7.4B.1.5-1: Maximum input level requirement for each CC

Channel bandwidth of Largest BW CC	Rx Parameter			
	Power in the Largest CC	Power in the other CC	Power in the Largest CC	Power in the other CC
5 MHz	-25^2-TT	-25^2 $-10*\log10(N_xSCS_x/N_ySCS_y)$ -TT	-27^3-TT	$-27^3$$-10*\log10(N_xSCS_x/N_ySCS_y)$ -TT
10 MHz	-25^2-TT	-25^2 $-10*\log10(N_xSCS_x/N_ySCS_y)$ -TT	-27^3-TT	$-27^3$$-10*\log10(N_xSCS_x/N_ySCS_y)$ -TT
15 MHz	-25^2-TT	-25^2 $-10*\log10(N_xSCS_x/N_ySCS_y)$ -TT	-27^3-TT	$-27^3$$-10*\log10(N_xSCS_x/N_ySCS_y)$ -TT
20 MHz	-25^2-TT	-25^2 $-10*\log10(N_xSCS_x/N_ySCS_y)$ -TT	-27^3-TT	$-27^3$$-10*\log10(N_xSCS_x/N_ySCS_y)$ -TT
25 MHz	-24^2-TT	-24^2 $-10*\log10(N_xSCS_x/N_ySCS_y)$ -TT	-26^3-TT	$-26^3$$-10*\log10(N_xSCS_x/N_ySCS_y)$ -TT
30 MHz	-23^2-TT	-23^2 $-10*\log10(N_xSCS_x/N_ySCS_y)$ -TT	-25^3-TT	$-25^3$$-10*\log10(N_xSCS_x/N_ySCS_y)$ -TT
40 MHz	-22^2-TT	-22^2 $-10*\log10(N_xSCS_x/N_ySCS_y)$ -TT	-24^3-TT	$-24^3$$-10*\log10(N_xSCS_x/N_ySCS_y)$ -TT
50 MHz	-21^2-TT	-21^2 $-10*\log10(N_xSCS_x/N_ySCS_y)$ -TT	-23^3-TT	$-23^3$$-10*\log10(N_xSCS_x/N_ySCS_y)$ -TT
60 MHz	-20^2-TT	-20^2 $-10*\log10(N_xSCS_x/N_ySCS_y)$ -TT	-22^3-TT	$-22^3$$-10*\log10(N_xSCS_x/N_ySCS_y)$ -TT
80 MHz	-20^2-TT	-20^2 $-10*\log10(N_xSCS_x/N_ySCS_y)$ -TT	-22^3-TT	$-22^3$$-10*\log10(N_xSCS_x/N_ySCS_y)$ -TT
90 MHz	-20^2-TT	-20^2 $-10*\log10(N_xSCS_x/N_ySCS_y)$ -TT	-22^3-TT	$-22^3$$-10*\log10(N_xSCS_x/N_ySCS_y)$ -TT
100 MHz	-20^2-TT	-20^2 $-10*\log10(N_xSCS_x/N_ySCS_y)$ -TT	-22^3-TT	$-22^3$$-10*\log10(N_xSCS_x/N_ySCS_y)$ -TT

NOTE 1: N_x, SCS_x is the number of RB's and Sub carrier spacing in the largest carrier bandwidth and could be LTE or NR carrier.
NOTE 2: Reference measurement channel refers to Clauses A.3.2.3 or A.3.3.3 in TS 38.521-1[8] for 64-QAM NR Carrier, and to Tables A.3.2-3, A.3.2-4 for 64QAM in TS 36.521-1[10] for E-UTRA Carrier.
NOTE 3: Reference measurement channel refers to Clauses A.3.2.4 or A.3.3.4 in TS 38.521-1[8] for 256QAM NR Carrier, and Tables A.3.2-5, A.3.2-6 in TS 36.521-1[10] for 256QAM E-UTRA Carrier.
NOTE 4: N_y, SCS_y is the number of RB's in any other carrier
NOTE 5: For NR carrier, the transmitter shall be set to 4dB below PCMAX_L at the minimum uplink configuration specified in Table 7.3.2-3 in [2] with PCMAX_L as defined in subclause 6.2B.4.
NOTE 6: For E-UTRA carrier, the transmitter shall be set to 4dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3.1-2 in [4] with P_{CMAX_L} as defined in subclause 6.2B.4 for single carrier.
NOTE 7: TT for each frequency is specified in Table 7.4B.1.5-2

Table 7.4B.1.5-2: Test Tolerance (Maximum input level)

f ≤ 3.0GHz	3.0GHz < f ≤6.0GHz
0.7 dB	1.0 dB

7.4B.2 Maximum Input Level for Intra-Band Non-Contiguous EN-DC (2 CCs)

Editor's note: The following aspects are either missing or not yet determined:

- Test frequencies for intra-band non-contiguous EN-DC are TBD in TS 38.508-1

7.4B.2.1 Test purpose

Maximum input level for intra-band non-contiguous EN-DC tests the UE's ability to receive data with a given average throughput for a specified reference measurement channel, under conditions of high signal level, ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area near to an e-NodeB or a gNB.

7.4B.2.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non contiguous EN-DC.

7.4B.2.3 Minimum conformance requirements

Refer to Clause 7.4B.0.2 for the intra-band non-contiguous EN-DC maximum input level requirement.

The normative reference for this requirement is TS 38.101-3 [4] Clause 7.4B.2, and 3GPP TS 38.101-1 [2] Clause 7.4, and 3GPP TS 36.101-1 [5] Clauses 7.4 and 7.4A

No exception requirements for E-UTRA CG and NR CG, LTE agnostic approach applies.

7.4B.2.4 Test Description

7.4B.2.4.1 Initial Condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.2B.3, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2.All of these configurations shall be tested with applicable test parameters for each intra-band non-contiguous EN-DC configuration specified in clause 5.3B.1.3, and are shown in table 7.4B.2.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 7.4B.2.4.1-1: Test configuration table

Initial Conditions								
Test Environment as specified in TS 38.508-1 [6] subclause 4.1					Normal			
Test Frequencies as specified in TS 38.508-1 [6] subclause 4.3.1					MaxWGap for intra-band non-contiguous EN-DC			
Test EN-DC bandwidth combination as specified in Table 5.3B.1.3-1 across bandwidth combination sets supported by the UE					Lowest, Mid, Highest of Channel BW for N_{RB_agg}			
Test SCS for the NR cell as specified in 38.521-1 [8] Table 5.3.5-1					Lowest			
Test Parameters for EN-DC Configuration								
Downlink Configuration					**Uplink Configuration**			
Test ID	**NR Modulation**	**NR RB allocation**	**E-UTRA Modulation**	**E-UTRA RB allocation**	**NR Modulation**	**NR RB allocation**	**E-UTRA Modulation**	**E-UTRA RB allocation**
1	CP-OFDM 64QAM	NOTE 1	NOTE 2	NOTE 2	DFT-s-OFDM QPSK	NOTE 1	NOTE 2	NOTE 2
2	CP-OFDM 256QAM	NOTE 1	NOTE 2	NOTE 2	DFT-s-OFDM QPSK	NOTE 1	NOTE 2	NOTE 2
NOTE 1: Same RB allocation shall be used per modulation as specified in Table 7.4.4.1-1 of TS 38.521-1[8] NOTE 2: Modulation and RB allocation for E-UTRA CC refers to the Talbe 4.6-2								

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.1.1 for TE diagram and section A.3.2.1 for UE diagram.

2. The parameter settings for the cell are set up according to TS 38.508-1 [6] subclause 4.4.3. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3

3. NR downlink signals are initially set up according to TS 38.521-1 [8] Annex C.0, C.1, C.2, C3., and uplink signals are according to TS 38.521-1 [8] Annex G.0, G.1, G.2, G.3.1. The E-UTRA downlink signal level and uplink signal level are set according to Table 4.6-1.

4. The UL Reference Measurement channels are TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.

5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 7.4B.2.4.3.

7.4B.2.4.2 Test Procedure

Same test procedure as specified in Clause 7.4.4.2 in TS 38.521-1 [8].

7.4B.2.4.3 Message Contents

Message contents are according to TS 38.508-1 [6] subclause 4.6.1.

7.4B.2.5 Test Requirement

Same test requirement as in clause 7.4.5 in TS 38.521-1 [8] for NR carrier.

7.4B.3 Maximum Input Level for Inter-band EN-DC within FR1

7.4B.3.1 Test purpose

Maximum input level for inter-band EN-DC tests the UE's ability to receive data with a given average throughput for a specified reference measurement channel, under conditions of high signal level, ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area near to an e-NodeB or a gNB.

7.4B.3.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC.

7.4B.3.3 Minimum conformance requirements

For inter-band EN-DC maximum input level is defined as the powers received at the UE antenna port over the Transmission bandwidth configuration of each CC in each CG, at which the specified relative throughput shall meet or exceed the minimum requirements for the specified reference measurement channel over each CC in each CG.

Maximum input level is defined as the maximum mean power received at the UE antenna port, at which the specified relative throughput shall meet or exceed the minimum requirements for the specified reference measurement channel. The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.4-1.

Table 7.4-1: Maximum input level

Rx Parameter	Units	Channel bandwidth											
		5 MHz	10 MHz	15 MHz	20 MHz	25 MHz	30 MHz	40 MHz	50 MHz	60 MHz	80 MHz	90 MHz	100 MHz
Power in Transmission Bandwidth Configuration	dBm	-25[2]				-24[2]	-23[2]	-22[2]	-21[2]	-20[2]			
		-27[3]				-26[3]	-25[3]	-24[3]	-23[3]	-22[3]			

NOTE 1: The transmitter shall be set to 4dB below P_{CMAX_L} at the minimum uplink configuration specified in Table 7.3-3 with P_{CMAX_L} as defined in subclause 6.2.4.
NOTE 2: Reference measurement channel is [TBD] for 64-QAM.
NOTE 3: Reference measurement channel is [TBD] for 256-QAM.

There is no exceptional requirement, LTE agnostic way is applied in the test.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.4B.3 and TS 38.101-1 clause 7.4.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.4B.3.4 Test Description

7.4B.3.4.1 Initial Condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.2B.4, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2.All of these configurations shall be tested with applicable test parameters for each inter-band EN-DC configuration specified in clause 5.5B.4, and the configurations for NR carrier are shown in TS 38.521-1 [8] table 7.4.4.1-1, the configurations for E-UTRA carrier are shown in Table 4.6-1.The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.1.1 for TE diagram and section A.3.2.1 for UE diagram. .

2. The parameter settings for the cell are set up according to TS 38.508-1 [6] subclause 4.4.3.

3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0, C.1,C.2,C3.1 and TS 38.521-1 [8] Annex C.0,C.1,C.2,C3.1for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H.0,H.1,H.2,H.3.1 and TS 38.521-1 [8] Annex G.0,G.1,G.2,G.3.1 for E-UTRA CG and NR CG respectively.

4. The UL Reference Measurement channels are TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.

5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 7.4B.3.4.3.

7 On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.4B.3.4.2 Test Procedure

Same test procedure as specified in clause 7.4.4.2

7.4B.3.4.3 Message Contents

Message contents are according to TS 38.508-1 [6] subclause 4.6.1.

7.4B.3.5 Test Requirement

Same test requirement as specified in TS 38.521-1 [8] table 7.4.5.

7.5 Adjacent channel selectivity

7.5B Adjacent channel selectivity for EN-DC

7.5B.0 Minimum Conformance Requirements

7.5B.0.1 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.0.1-1 and for test case 2 in Table 7.5B.0.1-2.

Table 7.5B.0.1-1: ACS test case 1

EN-DC Aggregated Bandwidth, MHz	<=100	>100, <=120	>120, <=140	>140, <=160
ACS, dB	X[1]	19.2	18.5	17.9
$P_{interferer}$, dBm	P_I [2]	Aggregated power + 17.7 dB	Aggregated power + 17 dB	Aggregated power + 16.4dB
Pw 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 [5] NOTE 2: P_I is from Table 7.5.1A-2 in [5] NOTE 3: Jammer BW and offset is from Table 7.5.1A-2 in [5] and is applied from the lowest edge of the lowest carrier and the highest edge of the highest carrier NOTE 4: For NR carrier, the transmitter shall be set to 4dB below $P_{CMAX\_L,f,c}$ at the minimum uplink configuration specified in Table 7.3.2-3 in [2] with $P_{CMAX\_L,f,c}$ as defined in subclause 6.2.4 from [2]. NOTE 5: For E-UTRA carrier, the transmitter shall be set to 4dB below $P_{CMAX\_L,c}$ at the minimum uplink configuration specified in Table 7.3.1-2 in [5] with $P_{CMAX\_L,c}$ as defined in subclause 6.2.5 for single carrier and in Table 7.3.1A-1 in [5] with P_{CMAX_L} as defined in subclause 6.2.5A for LTE-CA from [5].				

Table 7.5B.0.1-2: ACS test case 2

EN-DC Aggregated Bandwidth, MHz	<=100	>100, <=120	>120, <=140	>140, <=160
Pw in Transmission Bandwidth Configuration, perCC, 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 $+10\log_{10}(N_{RB,c}/N_{RB\ agg})$
$P_{interferer}$, 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 [5] NOTE 2: Jammer BW and offset is from Table 7.5.1A-3 in [5] and is applied from the lowest edge of the lowest carrier and the highest edge of the highest carrier NOTE 3: For NR carrier, the transmitter shall be set to 4dB below $P_{CMAX\_L,f,c}$ at the minimum uplink configuration specified in Table 7.3.2-3 in [2] with $P_{CMAX\_L,f,c}$ as defined in subclause 6.2.4 from [2]. NOTE 4: For E-UTRA carrier, the transmitter shall be set to 4dB below $P_{CMAX\_L,c}$ at the minimum uplink configuration specified in Table 7.3.1-2 in [5] with $P_{CMAX\_L,c}$ as defined in subclause 6.2.5 for single carrier and in Table 7.3.1A-1 in [5] with P_{CMAX_L} as defined in subclause 6.2.5A for LTE-CA from [5].				

7.5B.0.2 Intra-band non-contiguous EN-DC in FR1

For the E-UTRA sub-block containing one or multiple CC's, the requirement is defned in sub-clause 7.5.1 for single carrier operation and in sub-clause 7.5.1A for CA in [5].

For the NR sub-block, the requirement is defined in sub-clause 7.5 in [2].

The blocker configuration is defined in the general sub-clause 7.1 in [4].

7.5B.0.3 Inter-band EN-DC within FR1

Adjacent channel selectivity requirement for E-UTRA single carrier and CA operation specified in sub-clauses 7.5.1 and 7.5.1A of [5] and for NR single carrier and CA operation specified in sub-clauses 7.5 and 7.5A of [2] apply.

7.5B.0.4 Inter-band EN-DC including FR2

Adjacent channel selectivity requirement for E-UTRA single carrier and CA operation specified in sub-clauses 7.5.1 and 7.5.1A of [5] and for NR single carrier and CA operation specified in sub-clauses 7.5 and 7.5A of [3] apply.

7.5B.0.5 Inter-band EN-DC including both FR1 and FR2

Adjacent channel selectivity requirement for E-UTRA single carrier and CA operation specified in sub-clauses 7.5.1 and 7.5.1A of [5] and for NR single carrier and CA operation specified in sub-clauses 7.5 and 7.5A of [2] and [3] apply.The normative reference for this requirement is TS 38.101-3 [4] clause 7.5B.1, 7.5B.2, 7.5B.3, 7.5B.4 and 7.5B.5.

7.5B.1 Adjacent Channel Selectivity for intra-band contiguous EN-DC (2 CCs)

Editor's note: this clause is incomplete. The following aspects are either missing or not yet determined:

- The test point selection analysis is incomplete;
- Test configuration needs further investigation
- Test tolerance analysis is incomplete
- The modulated interferer bandwidth used in Test Procedure Step 4 has not been defined in Annex.

7.5B.1.1 Test purpose

Adjacent channel selectivity (ACS) is a measure of a receiver's ability to receive an NR and E-UTRA signal at its assigned channel frequency in the presence of an adjacent channel signal at a given frequency offset from the centre frequency of the assigned channel. ACS is the ratio of the receive filter attenuation on the assigned channel frequency to the receive filter attenuation on the adjacent channel(s).

7.5B.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC.

7.5B.1.3 Minimum conformance requirements

Refer to Clause 7.5B.0.1 for the intra-band contiguous EN-DC in FR1.

Exception requirements are applicable for NR but not for E-UTRA within this test. LTE anchor agnostic approach is not applied. E-UTRA test points are defined and measurements performed over the aggregated EN-DC bandwidth.

7.5B.1.4 Test description

7.5B.1.4.1 Initial Condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.2B.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2.All of these configurations shall be tested with applicable test parameters for each intra-band contiguous EN-DC configuration specified in clause 5.5B.2, and are shown in table 7.5B.1.4.1-1.

The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2 for E-UTRA RMC for TDD, TS 36.521-1 [10] Annex A.2 for E-UTRA RMC for FDD , TS 38.521-1 [8] Annex A.2 for NR UL RMC and TS 38.521-1 [8] Annex A.3 for NR DL RMC. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 7.5B.1.4.1-1: Test configuration table

Initial Conditions	
Test Environment as specified in TS 38.508-1 [6] subclause 4.1	TBD
Test Frequencies as specified in TS 38.508-1 [6] subclause 4.3.1	TBD
Test CC Combinations setting (N_{RB_agg}) as specified in TS 38.508-1 [6] subclause 4.3.1	TBD
Test SCS for the NR cell as specified in 38.521-1 [8] Table 5.3.5-1	TBD
Test Parameters for EN-DC Configuration	
FFS	

1. Connect the SS to the UE antenna connectors as shown in A.3.1.1 for SS diagram and A.3.2.1 for UE diagram in TS 38.508-1 [6] .

2. The parameter settings for the E-UTRA cell are set up according to TS 36.508[11] subclause 4.4.3, and parameter settings for the NR cell are set up according to TS 38.508-1 [6] subclause 4.4.3.

3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0 and TS 38.521-1 [8] Annex C.0 for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.

4. The UL Reference Measurement channels are TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.

5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 7.5B.1.4.3.

7.5B.1.4.2 Test Procedure

1. SS transmits PDSCH via PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC on the NR CC according to Table 7.5B.1.4.1-1. SS transmits PDSCH via PDCCH DCI format 1A for C_RNTI to transmit the DL RMC on the E-UTRA CC according to Table 7.5.4.1-1 in TS 36.521-1 [10].The SS sends downlink MAC padding bits on the DL RMC.

2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0_1 for C_RNTI to schedule the UL RMC on the NR CC according to Table 7.5B.1.4.1-1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 for C_RNTI to schedule the UL RMC on the E-UTRA CC according to Table 7.5.4.1-1 in TS 36.21-1 [10]. Since the UE has no payload data to send, the UE transmits uplink MAC padding bits on the UL RMC.

3. Set the Downlink signal level on the NR CC to the value as defined in Table 7.5.5-2 or Table 7.5.5-5 as appropriate in TS 38.521-1[8] (Case 1). Set the Downlink signal level on the E-UTRA CC to the value as defined in Table 7.5.5-2 in TS 36.521-1 [10] (Case 1).Send Uplink power control commands to the UE for the NR CC and E-UTRA CC (less or equal to 1dB step size should be used) , to ensure that the UE output power is within -$P_W \pm P_W$ dB of the target level in Table 7.5 B.0.11- (Case 1) for at least the duration of the Throughput measurement.

P_W is the power window according to Table 7.5B.1.4.2-1 for the carrier frequency f and the channel bandwidth BW.

4. Set the Interferer signal level to the value as defined in Table 7.5B.0.1-1 (Case 1) and frequency below the wanted signal on the NR CC and E-UTRA CC, using a modulated interferer bandwidth as defined in Annex [TBD].

5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex H.

6. Repeat steps from 3 to 5, using an interfering signal above the wanted signal in Case 1 at step 4.

7. Set the Downlink signal level on the NR CC to the value as defined in Table 7.5.5-3 or Table 7.5.5-6 as appropriate in TS 38. 521-1[8] (Case 2) . Set the Downlink signal level on the E-UTRA CC to the value as defined in Table 7.5.5-3 in TS 36.521-1 [10] (Case 2). Send Uplink power control commands to the UE for the NR CC and E-UTRA CC (less or equal to 1dB step size should be used), to ensure that the UE output power is within-$P_W \pm P_W$ dB of the target level in Table 7.5 B.0.1-2 (Case 2) for at least the duration of the Throughput measurement.

P_W is the power window according to Table 7.5B.1.4.2-1 for the carrier frequency f and the channel bandwidth BW.

8. Set the Interferer signal level to the value as defined in Table 7.5B.0.1-2 (Case 2) and frequency below the wanted signal on the NR CC and E-UTRA CC, using a modulated interferer bandwidth as defined in Annex [TBD].

9. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex H

10. Repeat steps from 7 to 9, using an interfering signal above the wanted signal in Case 2 at step 8.

11. Repeat for applicable channel bandwidths and operating band combinations in both Case 1 and Case 2.

Table 7.5B.1.4.2-1: Power Window (dB) for ACS

[TBD]

7.5B.1.4.3 Message Contents

Message contents are according to TS 38.508-1 [6] subclause 4.6.1.

7.5B.1.5 Test requirement

For the NR CC, the throughput measurement of the carrier derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3 under the conditions specified in Table 7.5B.0.1-1, and also under the conditions specified in Table 7.5B.0.1-2.

7.5B.2 Adjacent Channel Selectivity for intra-band non-contiguous EN-DC (2 CCs)

Editor's note: this clause is incomplete. The following aspects are either missing or not yet determined:

- The test point selection analysis is incomplete
- Test configuration needs further investigation
- "MaxWGap" in "Table 7.5B.2.4.1-1: Test Configuration Table" need FFS

7.5B.2.1 Test purpose

Same test purpose as sub-clause 7.5B.1.1

7.5B.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC.

7.5B.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.5B.0.2.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.5B.2.4 Test description

7.5B.2.4.1 Initial Condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.2B.3, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2.All of these configurations shall be tested with applicable test parameters for each intra-band non-contiguous EN-DC configuration specified in clause 5.5B.3, and the configuration for NR carrier are shown in TS 38.521-1 [8] clause 7.5.4.1 with the following exceptions:

Table 7.5B.2.4.1-1: Test Configuration Table

Initial Conditions	
Test Frequencies as specified in TS38.508 [7] subclause 4.3.1 for different DC bandwidth classes	[MaxWGap]
Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE	Highest N_{RB_agg} (NOTE 1)
NOTE 1: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same NRB_agg , only the combination with the highest NRB_SCG is tested.	

The initial test configurations for E-UTRA as specified in Table 4.6-1 except for the parameters specified in Table 7.5B.2.4.1-1.

For Initial conditions as in clause 7.5.4.1 in TS 38.521-1 [8], the following steps are added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1[10].

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Step 6 of Initial conditions as in clause 7.5.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508-1 [6] clause 4.5.

7.5B.2.4.2 Test Procedure

Same test procedure as specified in clause 7.5.4.2 in TS 38.521-1 [8] with the following exceptions for E-UTRA anchor

On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.5B.2.4.3 Message Contents

Message contents are according to TS 38.508-1 [6] subclause 4.6.1.

7.5B.2.5 Test requirement

Same test requirement as specified in TS 38.521-1 [8] Table 7.5.5.

7.5B.3 Adjacent Channel Selectivity for inter-band EN-DC within FR1 (2 CCs)

7.5B.3.1 Test purpose

Same test purpose as in clause 7.5B.1.1.

7.5B.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC within FR1.

7.5B.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.5 B.0.3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.5B.3.4 Test description

Same test description as in clause 7.5.4.2 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause 7.5.4.1 in TS 38.521-1 [8], add step 2.1 and step 3.1 as follows:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS36.521-1[10].

Step 6 of Initial conditions as in clause 7.5.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

Add step 7 to Initial conditions in clause 7.5.4.1 in TS 38.521-1 [8] as follows:

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.5B.3.5 Test requirement

For NR bands with F_{DL_high} < 2700 MHz and F_{UL_high} < 2700 MHz, the throughput measurement derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes

A.2.2, A.2.3, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.5B.3.5-2 and 7.5B.3.5-3.

Table 7.5B.3.5-1: ACS for NR bands with F_{DL_high} < 2700 MHz and F_{UL_high} < 2700 MHz

RX parameter	Units	Channel bandwidth				
		5 MHz	10 MHz	15 MHz	20 MHz	25 MHz
ACS	dB	[33]	[33]	[30]	[27]	[26]
RX parameter	Units	Channel bandwidth				
		30 MHz	40 MHz	50 MHz	60 MHz	80 MHz
ACS	dB	[25.5]	[24]	[23]	[22.5]	[21]
RX parameter	Units	Channel bandwidth				
		90 MHz	100 MHz			
ACS	dB	[20.5]	[20]			

Table 7.5B.3.5-2: Test parameters for NR bands with F_{DL_high} < 2700 MHz and F_{UL_high} < 2700 MHz, case 1

RX parameter	Units	Channel bandwidth				
		5 MHz	10 MHz	15 MHz	20 MHz	25 MHz
Power in transmission bandwidth configuration	dBm	REFSENS + 14 dB				
$P_{interferer}$	dBm	REFSENS + [45.5] dB	REFSENS + [45.5] dB	REFSENS + [42.5] dB	REFSENS + [39.5] dB	REFSENS + [38.5] dB
$BW_{interferer}$	MHz	5	5	5	5	5
$F_{interferer}$ (offset)	MHz	5 / -5	7.5 / -7.5	10 / -10	12.5 / -12.5	15 / -15
RX parameter	Units	Channel bandwidth				
		30 MHz	40 MHz	50 MHz	60 MHz	80 MHz
Power in transmission bandwidth configuration	dBm	REFSENS + 14 dB				
$P_{interferer}$	dBm	REFSENS + [38] dB	REFSENS + [36.5] dB	REFSENS + [35.5] dB	REFSENS + [35] dB	REFSENS + [33.5] dB
$BW_{interferer}$	MHz	5	5	5	5	5
$F_{interferer}$ (offset)	MHz	17.5 / -17.5	22.5 / -22.5	27.5 / -27.5	32.5 / -32.5	42.5 / -42.5
RX parameter	Units	Channel bandwidth				
		90 MHz	100 MHz			
Power in transmission bandwidth configuration	dBm	REFSENS + 14 dB				
$P_{interferer}$	dBm	REFSENS + [33] dB	REFSENS + [32.5] dB			
$BW_{interferer}$	MHz	5	5			
$F_{interferer}$ (offset)	MHz	47.5 / -47.5	52.5 / -52.5			

NOTE 1: The transmitter shall be set to 4dB below […].
NOTE 2: The absolute value of the interferer offset $F_{interferer}$ (offset) shall be further adjusted to $\left(\left\lceil |F_{interferer}| / SCS \right\rceil + 0.5\right) SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with an SCS equal to that of the wanted signal.
NOTE 3: The interferer consists of the NR interferer RMC specified in […]

Table 7.5B.3.5-3: Test parameters for NR bands with F_{DL_high} < 2700 MHz and F_{UL_high} < 2700 MHz, case 2

RX parameter	Units	Channel bandwidth				
		5 MHz	**10 MHz**	**15 MHz**	**20 MHz**	**25 MHz**
Power in transmission bandwidth configuration	dBm	[-56.5]	[-56.5]	[-53.5]	[-50.5]	[-49.5]
$P_{interferer}$	dBm	-25				
$BW_{interferer}$	MHz	5	5	5	5	5
$F_{interferer}$ (offset)	MHz	5 / -5	7.5 / -7.5	10 / -10	12.5 / -12.5	15 / -15
RX parameter	**Units**	**Channel bandwidth**				
		30 MHz	**40 MHz**	**50 MHz**	**60 MHz**	**80 MHz**
Power in transmission bandwidth configuration	dBm	[-49]	[-47]	[-46.5]	[-46]	[-44.5]
$P_{interferer}$	dBm	-25				
$BW_{interferer}$	MHz	5	5	5	5	5
$F_{interferer}$ (offset)	MHz	17.5 / -17.5	22.5 / -22.5	27.5 / -27.5	32.5 / -32.5	42.5 / -42.5
RX parameter	**Units**	**Channel bandwidth**				
		90 MHz	**100 MHz**			
Power in transmission bandwidth configuration	dBm	[-44]	[-43.5]			
$P_{interferer}$	dBm	-25				
$BW_{interferer}$	MHz	5	5			
$F_{interferer}$ (offset)	MHz	47.5 / -47.5	52.5 / -52.5			
NOTE 1: The transmitter shall be set to 24 dB below […]. NOTE 2: The absolute value of the interferer offset $F_{interferer}$ (offset) shall be further adjusted to $\left(\left\lceil \lvert F_{interferer} \rvert / SCS \right\rceil + 0.5\right) SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with an SCS equal to that of the wanted signal. NOTE 3: The interferer consists of the RMC specified in […]						

For NR bands with F_{DL_high} < 3300 MHz and F_{UL_high} < 3300 MHz, the throughput measurement derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3, A.3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.5B.3.5-5 and 7.5B.3.5-6.

Table 7.5B.3.5-4: ACS for NR bands with F_{DL_low} ≥ 3300 MHz and F_{UL_low} ≥ 3300 MHz

RX parameter	Units	Channel bandwidth				
		10 MHz	**15 MHz**	**20 MHz**	**40 MHz**	**50 MHz**
ACS	dB	[33]	[33]	[33]	[33]	[33]
RX parameter	**Units**	**Channel bandwidth**				
		60 MHz	**80 MHz**	**90 MHz**	**100 MHz**	
ACS	dB	[33]	[33]	[33]	[33]	

Table 7.5B.3.5-5: Test parameters for NR bands with F_{DL_low} ≥ 3300 MHz and F_{UL_low} ≥ 3300 MHz, case 1

RX parameter	Units	Channel bandwidth				
		10 MHz	15 MHz	20 MHz	40 MHz	50 MHz
Power in transmission bandwidth configuration	dBm	REFSENS + 14 dB				
$P_{interferer}$	dBm	REFSENS + [45.5] dB				
$BW_{interferer}$	MHz	10	15	20	40	50
$F_{interferer}$ (offset)	MHz	10 / -10	15 / -15	20 / -20	40 / -40	50 / -50
RX parameter	Units	Channel bandwidth				
		60 MHz	80 MHz	90 MHz	100 MHz	
Power in transmission bandwidth configuration	dBm	REFSENS + 14 dB				
$P_{interferer}$	dBm	REFSENS + [45.5] dB	REFSENS + [45.5] dB	REFSENS + [45.5] dB	REFSENS + [45.5] dB	
$BW_{interferer}$	MHz	60	80	90	100	
$F_{interferer}$ (offset)	MHz	60 / -60	80 / -80	90 / -90	100 / -100	

NOTE 1: The transmitter shall be set to 4dB below […].
NOTE 2: The absolute value of the interferer offset $F_{interferer}$ (offset) shall be further adjusted to $\left(\left\lceil \left|F_{interferer}\right| / SCS \right\rceil + 0.5\right)SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with an SCS equal to that of the wanted signal.
NOTE 3: The interferer consists of the RMC specified in […]

Table 7.5B.3.5-6: Test parameters for NR bands with F_{DL_low} ≥ 3300 MHz and F_{UL_low} ≥ 3300 MHz, case 2

RX parameter	Units	Channel bandwidth				
		10 MHz	15 MHz	20 MHz	40 MHz	50 MHz
Power in transmission bandwidth configuration	dBm	[-56.5]				
$P_{interferer}$	dBm	-25				
$BW_{interferer}$	MHz	10	15	20	40	50
$F_{interferer}$ (offset)	MHz	10 / -10	15 / -15	20 / -20	40 / -40	50 / -50
RX parameter	Units	Channel bandwidth				
		60 MHz	80 MHz	90 MHz	100 MHz	
Power in transmission bandwidth configuration	dBm	[-56.5]				
$P_{interferer}$	dBm	-25	-25	-25	-25	
$BW_{interferer}$	MHz	60	80	90	100	
$F_{interferer}$ (offset)	MHz	60 / -60	80 / -80	90 / -90	100 / -100	

NOTE 1: The transmitter shall be set to 24 dB below […].
NOTE 2: The absolute value of the interferer offset $F_{interferer}$ (offset) shall be further adjusted to $\left(\left\lceil \left|F_{interferer}\right| / SCS \right\rceil + 0.5\right)SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. The interferer is an NR signal with an SCS equal to that of the wanted signal.
NOTE 3: The interferer consists of the RMC specified in […]

7.5B.4 Adjacent Channel Selectivity for inter-band EN-DC including FR2 (2 CCs)

7.5B.4.1 Test purpose

Same test purpose as in clause 7.5B.1.1.

7.5B.4.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC including FR2.

7.5B.4.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.5B.0.4.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.5B.4.4 Test description

7.5B.4.4.1 Initial Condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.2B.5, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-2 [9] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each inter-band EN-DC including FR2 configuration specified in clause 5.5B.5, and the configuration for NR carrier are shown in TS 38.521-2 [9] Table 7.5.4.1-1.

For Initial conditions as in clause 7.5.4.1 in TS 38.521-2 [9], the following steps are added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS 36.521-1[10].

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Step 6 of Initial conditions as in clause 7.5.4.1 in TS 38.521-2 [9] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release On according to TS 38.508-1 [6] clause 4.5.

7.5B.4.4.2 Test Procedure

Same test procedure as specified in clause 7.5.4.2 in TS 38.521-2 [9] with the following exceptions for E-UTRA anchor

On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set *TimeAlignmentTimerDedicated* IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.5B.4.4.3 Message contents

Message contents are according to TS 38.508-1 [6] subclause 4.6.1.

7.5B.4.5 Test requirement

The throughput measurement derived in test procedure shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A, under the conditions specified in Table 7.5B.4.5-2 and also under the conditions specified in Table 7.5B.4.5-3.

Table 7.5B.4.5-1: Adjacent channel selectivity

Rx Parameter	Units	Channel bandwidth			
		50 MHz	100 MHz	200 MHz	400 MHz
ACS for band n257, n258, n261	dB	23	23	23	23
ACS for band n260	dB	22	22	22	22

Table 7.5B.4.5-2: Test parameters for adjacent channel selectivity, Case 1

Rx Parameter	Units	Channel bandwidth			
		50 MHz	100 MHz	200 MHz	400 MHz
Power in Transmission Bandwidth Configuration	dBm	REFSENS + 14 dB + TT			
$P_{Interferer}$ for band n257, n258, n261	dBm	REFSENS + 35.5 dB	REFSENS +35.5dB	REFSENS +35.5dB	REFSENS +35.5dB
$P_{Interferer}$ for band n260	dBm	REFSENS + 34.5 dB	REFSENS +34.5dB	REFSENS +34.5dB	REFSENS +34.5dB
$BW_{Interferer}$	MHz	50	100	200	400
$F_{Interferer}$ (offset)	MHz	50 / -50 NOTE 3	100 / -100 NOTE 3	200 / -200 NOTE 3	400 / -400 NOTE 3
NOTE 1: The interferer consists of the Reference measurement channel specified in Annex A with one sided dynamic OCNG Pattern as described in Annex A.5.2.1 and set-up according to Annex C []. NOTE 2: The REFSENS power level is specified in Table 7.3.2.3-1. NOTE 3: The absolute value of the interferer offset $F_{Interferer}$ (offset) shall be further adjusted to $(\lceil \lvert F_{Interferer} \rvert / SCS \rceil + 0.5) SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. Wanted and interferer signal have same SCS.					

Table 7.5B.4.5-3: Test parameters for adjacent channel selectivity, Case 2

Rx Parameter	Units	Channel bandwidth			
		50 MHz	100 MHz	200 MHz	400 MHz
Power in Transmission Bandwidth Configuration for band n257, n258, n261	dBm	-46.5 + TT	-46.5 + TT	-46.5 + TT	-46.5 + TT
Power in Transmission Bandwidth Configuration for band n260	dBm	-45.5 + TT	-45.5 + TT	-45.5 + TT	-45.5 + TT
$P_{Interferer}$	dBm	-25			
$BW_{Interferer}$	MHz	50	100	200	400
$F_{Interferer}$ (offset)	MHz	50 / -50 NOTE 2	100 / -100 NOTE 2	200 / -200 NOTE 2	400 / -400 NOTE 2
NOTE 1: The interferer consists of the Reference measurement channel specified in Annex A with one sided dynamic OCNG Pattern TDD as described in Annex A.5.2.1 and set-up according to Annex C. NOTE 2: The absolute value of the interferer offset FInterferer (offset) shall be further adjusted to $(\lceil \lvert F_{Interferer} \rvert / SCS \rceil + 0.5) SCS$ MHz with SCS the sub-carrier spacing of the wanted signal in MHz. Wanted and interferer signal have same SCS.					

7.6 Blocking characteristics

7.6B Blocking characteristics for EN-DC

7.6B.1 General

The blocking characteristic for EN-DC in FR1 is a measure of the receiver's ability of an UE that support EN-DC in FR1 to receive a wanted signal at its assigned channel frequency in the presence of an unwanted interferer on frequencies other than those of the spurious response or the adjacent channels, without this unwanted input signal causing a degradation of the performance of the receiver beyond a specified limit. The blocking performance shall apply at all frequencies except those at which a spurious response occur.

7.6B.2 Inband blocking for EN-DC

7.6B.2.0 Minimum Conformance Requirements

7.6B.2.0.1 Intra-band contiguous EN-DC

Intra-band contiguous EN-DC in-band blocking requirement and parameters are defined in Table 7.6B.2.0.1-1.

Table 7.6B.2.0.1-1: In-band blocking for intra-band contiguous EN-DC

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_W [1]	16.8	17.5	18

NOTE 1: P_W is wanted signal power level at the specified EN-DC aggregated Bandwidth from Table 7.6.1.1A-1 in [5].
NOTE 2: Interferer values are specified from Table 7.6.1.1A-2 in [5].
NOTE 3: Jammer BW and offset is from Table 7.6.1.1A-1 in [5] and is applied from the lowest edge of the lowest carrier and the highest edge of the highest carrier.
NOTE 4: For NR carrier, the transmitter shall be set to 4dB below $P_{CMAX\_L,f,c}$ at the minimum uplink configuration specified in Table 7.3.2-3 with $P_{CMAX\_L,f,c}$ as defined in subclause 6.2.4 from [2].
NOTE 5: For E-UTRA carrier, the transmitter shall be set to 4dB below $P_{CMAX\_L,c}$ at the minimum uplink configuration specified in Table 7.3.1-2 with $P_{CMAX\_L,c}$ as defined in subclause 6.2.5 for single carrier and in Table 7.3.1A-1 with P_{CMAX_L} as defined in subclause 6.2.5A for LTE-CA from [5].

The normative reference for this requirement is TS 38.101-3 [4] clause 7.6B.2.1.

7.6B.2.0.2 Intra-band non-contiguous EN-DC

For the E-TRA sub-block containing one or multiple CC’s, the requirement is defined in sub-clause 7.6.1.1 for single carrier operation and in sub-clause 7.6.1.1A for CA in [5].

For the NR sub-block, the requirement is defined in sub-clause 7.6.2 in [2].

The blocker configuration is defined in the general sub-clause 7.1.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.6B.2.2.

7.6B.2.0.3 Inter-band EN-DC within FR1

Inband blocking requirement for E-UTRA single carrier and CA operation specified in sub-clauses 7.6.1.1 and 7.6.1.1A of [5] and for NR single carrier and CA operation specified in sub-clauses 7.6.2 and 7.6A.2 of [2] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.6B.2.3.

7.6B.2.0.4 Inter-band EN-DC including FR2

Inband blocking requirement for E-UTRA single carrier and CA operation specified in sub-clauses 7.6.1.1 and 7.6.1.1A of [5] and for NR single carrier and CA operation specified in sub-clauses 7.6.2 and 7.6A.2 of [3] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.6B.2.4.

7.6B.2.0.5 Inter-band EN-DC including both FR1 and FR2

Inband blocking requirement for E-UTRA single carrier and CA operation specified in sub-clauses 7.6.1.1 and 7.6.1.1A of [5] and for NR single carrier and CA operation specified in sub-clauses 7.6.2 and 7.6A.2 of [2] and [3] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.6B.2.5.

7.6B.2.1 Inband blocking for intra-band contiguous EN-DC (2 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- MU is TBD in Annex F
- UL RB allocation is TBD due to the missing table for UL configuration in 38.101-3

7.6B.2.1.1 Test Purpose

In-band blocking is defined for an unwanted interfering signal falling into the range from 15MHz below to 15MHz above the UE receive band, at which the relative throughput shall meet or exceed the requirement for the specified measurement channels. The lack of in-band blocking ability will decrease the coverage area when other NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6B.2.1.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC in FR1.

7.6B.2.1.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7. 6 B.2.0.1.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

7.6B.2.1.4 Test Description

7.6 B.2.1.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC configuration specified in clause 5.3B.1.2 and are shown in table 7.6B.2.1.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annex A.2 and A.3 respectively. The details of the OCNG patterns used are specified in TS 36.521-1 [10] Annex A.5 and in TS 38.521-1 [8] Annex A.5 for E-UTRA CG and NR CG respectively. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 7.6B.2.1.4.1-1: Test configuration table

<table>
<tr><th colspan="8">Initial Conditions</th></tr>
<tr><td colspan="4">Test Environment as specified in TS 38.508-1 [6] subclause 4.1</td><td colspan="4">Normal</td></tr>
<tr><td colspan="4">Test Frequencies as specified in TS38.508-1 [6] clause 4.3.1 for different EN-DC bandwidth classes</td><td colspan="4">Mid range</td></tr>
<tr><td colspan="4">Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE</td><td colspan="4">Lowest N_{RB_agg}, Highest N_{RB_agg} (NOTE 3)</td></tr>
<tr><td colspan="4">NR Test SCS as specified in Table 5.3.5-1 in TS 38.521-1[8]</td><td colspan="4">Lowest SCS per Channel Bandwidth</td></tr>
<tr><th colspan="8">NR/E-UTRA Test Parameters</th></tr>
<tr><th colspan="4">Downlink Configuration</th><th colspan="4">Uplink Configuration</th></tr>
<tr><th>NR Modulation</th><th>NR RB allocation</th><th>E-UTRA Modulation</th><th>E-UTRA RB allocation</th><th>NR Modulation</th><th>NR RB allocation</th><th>E-UTRA Modulation</th><th>E-UTRA RB allocation</th></tr>
<tr><td>CP-OFDM QPSK</td><td>Full RB (NOTE 1)</td><td>QPSK</td><td>Full RB</td><td>DFT-s-OFDM QPSK</td><td>TBD</td><td>QPSK</td><td>TBD</td></tr>
<tr><td colspan="8">NOTE 1: Full RB allocation shall be used per each SCS and channel BW as specified in Table 7.3.2.4.1-2 of TS 38.521-1[8].
NOTE 2: Test Channel Bandwidths are checked separately for each EN-DC band, which applicable channel bandwidths are specified in Table 5.3B.1.2-1.
NOTE 3: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same N_{RB_agg} , only the combination with the highest NRB_SCG is tested.</td></tr>
</table>

1. Connect the SS to the UE antenna connectors as shown in [6] TS 38.508-1 Annex A, in Figure [A.3.1.4.1] for SS diagram and section A.3.2 for UE diagram.

2. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] subclause 4.4.3.

3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C and TS 38.521-1 [8] Annex C for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.

4. The UL and DL Reference Measurement channels are TS 36.521-1 [10] Annex A.2, A.3 and TS 38.521-1 [8] Annex A.2 , A.3 for E-UTRA CG and NR CG respectively.

5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 7.6B.2.1.4.3.

7.6B.2.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A and PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.6B.2.1.4.1-1 on E-UTRA CC and NR CC respectively. The SS sends downlink MAC padding bits on the DL RMC.

2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according to table 7.6B.2.1.4.1-1 on E-UTRA CC and NR CC respectively. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

3. Set the Downlink signal level to the value as defined in Table 7.6B.2.1.5-1. Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that for at least the duration of the Throughput measurement:

   The E-UTRA CC output power is within $-P_W \pm P_W$ dB of (target level in Table 7.6B.2.1.5-1 + [10log(P_L_{CRB}/N_{RB_alloc})]). P_W is the power window according to Table 7.6B.2.1.5-2 for the carrier frequency f.

The NR CC output power is within $-P_W \pm P_W$ dB of (target level in Table 7.6B.2.1.5-1 + [10log(S_L_{CRB}/N_{RB_alloc})]). P_W is the power window according to Table 7.6B.2.1.5-3 for the carrier frequency f and the channel bandwidth BW.

4. Set the parameters of the signal generator for an interfering signal below the aggregated component carriers in Case 1 according to Table 7.6B.2.1.5-1.
5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex H.2.
6. Repeat steps from 4 to 5, using an interfering signal above the aggregated component carriers in Case 1 at step 4.
7. Repeat steps from 4 to 6, using interfering signals in Case 2 at step 4 and 6.

7.6B.2.1.4.3 Message contents

Message contents are according to TS 38.508-1 [6] subclause 4.6 Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED.

7.6B.2.1.5 Test Requirement

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in TS 36.521-1 [10] Annex A.3 and TS 38.521-1 [8] Annex A.3 for E-UTRA CG and NR CG respectively with parameters specified in Table 7.6B.2.1.5-1 for the specified wanted signal mean power in the presence of interfering signals.

Table 7.6B.2.1.5-1: In-band blocking for intra-band contiguous EN-DC

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_W [1]	16.8	17.5	18
NOTE 1: P_W is wanted signal power level at the specified EN-DC aggregated Bandwidth from Table 7.6.1.1A-1 in [5]. NOTE 2: Interferer values are specified from Table 7.6.1.1A-2 in [5]. NOTE 3: Jammer BW and offset is from Table 7.6.1.1A-1 in [5] and is applied from the lowest edge of the lowest carrier and the highest edge of the highest carrier. NOTE 4: For NR carrier, the transmitter shall be set to 4dB below $P_{CMAX\_L,f,c}$ at the minimum uplink configuration specified in Table 7.3.2-3 with $P_{CMAX\_L,f,c}$ as defined in subclause 6.2.4 from [2]. NOTE 5: For E-UTRA carrier, the transmitter shall be set to 4dB below $P_{CMAX\_L,c}$ at the minimum uplink configuration specified in Table 7.3.1-2 with $P_{CMAX\_L,c}$ as defined in subclause 6.2.5 for single carrier and in Table 7.3.1A-1 with P_{CMAX_L} as defined in subclause 6.2.5A for LTE-CA from [5].				

Table 7.6B.2.1.5-2: Power Window (dB) for E-UTRA CC

f ≤ 3GHz	**3GHz < f ≤ 4.2GHz**
1.7	2.0
NOTE: Power Window comprises two parts, UE Power step tolerance and test system power measurement uncertainty.	

Table 7.6B.2.1.5-3: Power Window (dB) for NR CC

	f ≤ 3GHz	**3GHz < f ≤ 4.2GHz**	**4.2GHz < f ≤ 6GHz**
BW ≤ 20MHz	1.4	1.7	2.0
20MHz < BW ≤ 40MHz	1.4	1.7	2.2
40MHz < BW ≤ 100MHz	2.1	2.3	2.3
NOTE: Power Window comprises two parts, UE Power step tolerance and test system power measurement uncertainty.			

7.6B.2.2 Inband blocking for intra-band non-contiguous EN-DC (2 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- MU is TBD in Annex F
- MaxWGap is TBD

7.6B.2.2.1 Test Purpose

Same test purpose as in clause 7.6.2.1 in TS 38.521-1 [8] for the NR carrier.

7.6B.2.2.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC in FR1.

7.6B.2.2.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6B.2.0.2.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.6B.2.2.4 Test Description

Same test description as in clause 7.6.2.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

Table 7.6B.2.2.4-1: Test Configuration Table

Initial Conditions	
Test Frequencies as specified in TS38.508-1 [6] subclause 4.3.1 for different EN-DC bandwidth classes	[MaxWGap]
Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE	Highest N_{RB_agg} (NOTE1)
NOTE 1: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same NRB_agg , only the combination with the highest NRB_SCG is tested.	

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1 except for the parameters specified in Table 7.6B.2.2.4-1.

For Initial conditions as in clause 7.6.2.4.1 in TS 38.521-1 [8], add step 2.1 and step 3.1 as follows:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS36.521-1[10].

Step 6 of Initial conditions as in clause 7.6.2.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

Add step 7 to Initial conditions in clause 7.6.2.4.1 in TS 38.521-1 [8] as follows:

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.6B.2.2.5 Test Requirement

Same test requirement as in clause 7.6.2.5 in TS 38.521-1 [8].

7.6B.2.3 Inband blocking for inter-band EN-DC within FR1 (2 CCs)

7.6B.2.3.1 Test Purpose

Same test purpose as in clause 7.6.2.1 in TS 38.521-1 [8] for the NR carrier.

7.6B.2.3.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC within FR1.

7.6B.2.3.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6B.2.0.3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.6B.2.3.4 Test Description

Same test description as in clause 7.6.2.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause 7.6.2.4.1 in TS 38.521-1 [8], add step 2.1 and step 3.1 as follows:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS36.521-1[10].

Step 6 of Initial conditions as in clause 7.6.2.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

Add step 7 to Initial conditions in clause 7.6.2.4.1 in TS 38.521-1 [8] as follows:

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.6B.2.3.5 Test Requirement

Same test requirement as in clause 7.6.2.5 in TS 38.521-1 [8].

7.6B.3 Out-of-band blocking for EN-DC

7.6B.3.0 Minimum Conformance Requirements

7.6B.3.0.1 Intra-band contiguous EN-DC

Intra-band contiguous EN-DC out-of-band requirement and parameters are defined in Table 7.6B.3.1-1.

Table 7.6B.3.0-1: Out-of-band blocking for intra-band contiguous EN-DC

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			
	9			

NOTE 1:	Interferer values and offsets are specified from Table 7.6.2.1A-2 in [5].
NOTE 2:	For NR carrier, the transmitter shall be set to 4dB below $P_{CMAX\_L,f,c}$ at the minimum uplink configuration specified in Table 7.3.2-3 with $P_{CMAX\_L,f,c}$ as defined in subclause 6.2.4 from [2].
NOTE 3:	For E-UTRA carrier, the transmitter shall be set to 4dB below $P_{CMAX\_L,c}$ at the minimum uplink configuration specified in Table 7.3.1-2 with $P_{CMAX\_L,c}$ as defined in subclause 6.2.5 for single carrier and in Table 7.3.1A-1 with P_{CMAX_L} as defined in subclause 6.2.5A for LTE-CA from [5].

The normative reference for this requirement is TS 38.101-3 [4] clause 7.6B.3.1.

7.6B.3.0.2 Intra-band non-contiguous EN-DC

For the E-UTRA sub-block containing one or multiple CC's, the requirement is defined in sub-clause 7.6.2.1 for single carrier operation and in sub-clause 7.6.2.1A for CA in [5].

For the NR sub-block, the requirement is defined in sub-clause 7.6.3 in [2].

The normative reference for this requirement is TS 38.101-3 [4] clause 7.6B.3.2.

7.6B.3.0.3 Inter-band EN-DC within FR1

Out-of-band blocking requirements for E-UTRA single carrier and CA operation specified in sub-clauses 7.6.2.1 and 7.6.2.1A of [5] and for NR single carrier and CA operation specified in sub-clauses 7.6.3 and 7.6A.3 of [2] apply for lowest level EN-DC fallbacks (two bands) in section 5.2B.4.1 with following conditions:

- one E-UTRA uplink carrier with the output power set to 4dB below P_{CMAX_L} and the NR band whose downlink is being tested has its uplink carrier output power set to minimum output power as defined in sub-clause 6.3.1 of [2].
- one NR uplink carrier with the output power set to 4dB below P_{CMAX_L} on the NR band with both E-UTRA and NR downlinks being tested with E-UTRA output power set to minimum output power as defined in sub-clause 6.3.2.1 of [5].

The normative reference for this requirement is TS 38.101-3 [4] clause 7.6B.3.3.

7.6B.3.0.4 Inter-band EN-DC including FR2

Out-of-band blocking requirements specified for E-UTRA single carrier and CA operation specified in sub-clauses 7.6.2.1 and 7.6.2.1A of [5] apply for lowest level EN-DC fallbacks (two bands) in section 5.2B.5.1 with only E-UTRA UL with output power as in TS 36.101 [5] (4dB below P_{CMAX_L}).

The normative reference for this requirement is TS 38.101-3 [4] clause 7.6B.3.4.

7.6B.3.0.5 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 sub-clauses 7.6.2.1 and 7.6.2.1A of [5] and for NR single carrier and CA operation specified in sub-clauses 7.6.3 and 7.6A.3 of [2] apply for lowest level EN-DC fallbacks (three bands) in section 5.2B.6.2 with only E-UTRA UL with output power as in TS 36.101 [5] (4dB below P_{CMAX_L}).

The normative reference for this requirement is TS 38.101-3 [4] clause 7.6B.3.5.

7.6B.3.1 Out-of-band blocking for intra-band contiguous EN-DC (2 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- MU is TBD in Annex F
- UL RB allocation is TBD due to the missing table for UL configuration in 38.101-3

7.6B.3.1.1 Test Purpose

Out-of-band band blocking is defined for an unwanted CW interfering signal falling more than 15 MHz below or above the UE receive band, at which a given average throughput shall meet or exceed the requirement for the specified measurement channels.

For the first 15 MHz below or above the UE receive band the appropriate in-band blocking or adjacent channel selectivity in sub-clause 7.6B.2.1 and sub-clause 7.5B.1 shall be applied.

The lack of out-of-band blocking ability will decrease the coverage area when other NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6B.3.1.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC in FR1.

7.6B.3.1.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6B.3.0.1.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

7.6B.3.1.4 Test Description

7.6B.3.1.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC configuration specified in clause 5.3B.1.2 and are shown in table 7.6B.3.1.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annex A.2 and A.3 respectively. The details of the OCNG patterns used are specified in TS 36.521-1 [10] Annex A.5 and in TS 38.521-1 [8] Annex A.5 for E-UTRA CG and NR CG respectively. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 7.6B.3.1.4.1-1: Test configuration table

Initial Conditions							
Test Environment as specified in TS 38.508-1 [6] subclause 4.1				Normal			
Test Frequencies as specified in TS38.508-1 [6] clause 4.3.1 for different EN-DC bandwidth classes				Mid range			
Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE				Highest N_{RB_agg} (NOTE 3)			
NR Test SCS as specified in Table 5.3.5-1 in TS 38.521-1[8]				Lowest SCS per Channel Bandwidth			
NR/E-UTRA Test Parameters							
Downlink Configuration				**Uplink Configuration**			
NR Modulation	**NR RB allocation**	**E-UTRA Modulation**	**E-UTRA RB allocation**	**NR Modulation**	**NR RB allocation**	**E-UTRA Modulation**	**E-UTRA RB allocation**
CP-OFDM QPSK	Full RB (NOTE 1)	QPSK	Full RB	DFT-s-OFDM QPSK	TBD	QPSK	TBD
NOTE 1: Full RB allocation shall be used per each SCS and channel BW as specified in Table 7.3.2.4.1-2 of TS 38.521-1[8]. NOTE 2: Test Channel Bandwidths are checked separately for each EN-DC band, which applicable channel bandwidths are specified in Table 5.3B.1.2-1. NOTE 3: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same N_{RB_agg} , only the combination with the highest NRB_SCG is tested.							

1. Connect the SS to the UE antenna connectors as shown in [6] TS 38.508-1 Annex A, in Figure [A.3.1.4.2] for SS diagram and section A.3.2 for UE diagram.

2. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] subclause 4.4.3.

3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C and TS 38.521-1 [8] Annex C for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.

4. The UL and DL Reference Measurement channels are TS 36.521-1 [10] Annex A.2, A.3 and TS 38.521-1 [8] Annex A.2 , A.3 for E-UTRA CG and NR CG respectively.

5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 7.6B.3.1.4.3.

7.6B.3.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A and PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.6B.3.1.4.1-1 on E-UTRA CC and NR CC respectively. The SS sends downlink MAC padding bits on the DL RMC.

2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according to table 7.6B.3.1.4.1-1 on E-UTRA CC and NR CC respectively. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

3. Set the Downlink signal level to the value as defined in Table 7.6B.3.1.5-1. Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that for at least the duration of the Throughput measurement:

   The E-UTRA CC output power is within $-P_W \pm P_W$ dB of (target level in Table 7.6B.3.1.5-1 + [$10\log(P\_L_{CRB}/N_{RB\_alloc})$]). P_W is the power window according to Table 7.6B.3.1.5-2 for the carrier frequency f. The NR CC output power is within $-P_W \pm P_W$ dB of (target level in Table 7.6B.3.1.5-1 + [$10\log(S\_L_{CRB}/N_{RB\_alloc})$]). P_W is the power window according to Table 7.6B.3.1.5-3 for the carrier frequency f and the channel bandwidth BW.

4. Set the parameters of the CW signal generator for an interfering signal below the aggregated component carriers according to Table 7.6B.3.1.5-1. The frequency step size is 1MHz.

5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex H.2.

6. Repeat steps from 4 to 5, using an interfering signal above the aggregated component carriers at step 4.

7.6B.3.1.4.3 Message contents

Message contents are according to TS 38.508-1 [6] subclause 4.6 Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED.

7.6B.3.1.5 Test Requirement

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in TS 36.521-1 [10] Annex A.3 and TS 38.521-1 [8] Annex A.3 for E-UTRA CG and NR CG respectively with parameters specified in Table 7.6B.3.1.5-1 for the specified wanted signal mean power in the presence of interfering signals.

Table 7.6B.3.1.5-1: Out-of-band blocking for intra-band contiguous EN-DC

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			
	9			

NOTE 1:	Interferer values and offsets are specified from Table 7.6.2.1A-2 in [5]
NOTE 2:	For NR carrier, the transmitter shall be set to 4dB below $P_{CMAX\_L,f,c}$ at the minimum uplink configuration specified in Table 7.3.2-3 with $P_{CMAX\_L,f,c}$ as defined in subclause 6.2.4 from [2].
NOTE 3:	For E-UTRA carrier, the transmitter shall be set to 4dB below $P_{CMAX\_L,c}$ at the minimum uplink configuration specified in Table 7.3.1-2 with $P_{CMAX\_L,c}$ as defined in subclause 6.2.5 for single carrier and in Table 7.3.1A-1 with P_{CMAX_L} as defined in subclause 6.2.5A for LTE-CA from [5].

Table 7.6B.3.1.5-2: Power Window (dB) for E-UTRA CC

f ≤ 3GHz	3GHz < f ≤ 4.2GHz
1.7	2.0
NOTE: Power Window comprises two parts, UE Power step tolerance and test system power measurement uncertainty.	

Table 7.6B.3.1.5-3: Power Window (dB) for NR CC

	f ≤ 3GHz	3GHz < f ≤ 4.2GHz	4.2GHz < f ≤ 6GHz
BW ≤ 20MHz	1.4	1.7	2.0
20MHz < BW ≤ 40MHz	1.4	1.7	2.2
40MHz < BW ≤ 100MHz	2.1	2.3	2.3
NOTE: Power Window comprises two parts, UE Power step tolerance and test system power measurement uncertainty.			

7.6B.3.2 Out-of-band blocking for intra-band non-contiguous EN-DC (2 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- MU is TBD in Annex F
- MaxWGap is TBD

7.6B.3.2.1 Test Purpose

Same test purpose as in clause 7.6.3.1 in TS 38.521-1 [8] for the NR carrier.

7.6B.3.2.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC in FR1.

7.6B.3.2.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6B.3.0.2.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.6B.3.2.4 Test Description

Same test description as in clause 7.6.3.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

Table 7.6B.3.2.4-1: Test Configuration Table

Initial Conditions	
Test Frequencies as specified in TS38.508-1 [6] subclause 4.3.1 for different EN-DC bandwidth classes	[MaxWGap]
Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE	Highest N_{RB_agg} (NOTE1)
NOTE 1: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same NRB_agg , only the combination with the highest NRB_SCG is tested.	

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1 except for the parameters specified in Table 7.6B.3.2.4-1.

For Initial conditions as in clause 7.6.3.4.1 in TS 38.521-1 [8], add step 2.1 and step 3.1 as follows:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS36.521-1[10].

Step 6 of Initial conditions as in clause 7.6.3.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

Add step 7 to Initial conditions in clause 7.6.3.4.1 in TS 38.521-1 [8] as follows:

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.6B.3.2.5 Test Requirement

Same test requirement as in clause 7.6.3.5 in TS 38.521-1 [8].

7.6B.3.3 Out-of-band blocking for inter-band EN-DC within FR1 (2 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- Test description for the second condition in 7.6B.3.0.3 is FFS

7.6B.3.3.1 Test Purpose

Same test purpose as in clause 7.6.3.1 in TS 38.521-1 [8] for the NR carrier.

7.6B.3.3.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC within FR1.

7.6B.3.3.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6B.3.0.3.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

7.6B.3.3.4 Test Description

For the first condition in 7.6B.3.0.3 the following test description applies:

Same test description as in clause 7.6.3.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause 7.6.3.4.1 in TS 38.521-1 [8], add step 2.1 and step 3.1 as follows:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level is set according to Table 4.6-1, uplink signal level is set by sending uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that the UE output power is within +0, - 3.4 dB of the 4dB below P_{CMAX_L} with P_{CMAX_L} as defined in clause 6.2.5 of TS36.521-1[10] for carrier frequency $f \leq 3.0GHz$ or within +0, -4.0 dB of the target level for carrier frequency $3.0GHz < f \leq 4.2GHz$, for at least the duration of the throughput measurement, and propagation conditions are set according to Annex B.0 of TS36.521-1[10].

Step 6 of Initial conditions as in clause 7.6.3.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

Add step 7 to Initial conditions in clause 7.6.3.4.1 in TS 38.521-1 [8] as follows:

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Step 4 of Test Procedure as in clause 7.6.3.4.2 in TS 38.521-1 [8] is replaced by:

4. Set the NR downlink signal level according to the table 7.6.3.5-1 or 7.6.3.5-3 in TS 38.521-1 [8]. Send continuously uplink power control "down" commands in every uplink scheduling information to the UE; allow at least 200ms starting from the first TPC command in this step to ensure that the UE transmits at its minimum output power for at least the duration of the throughput measurement.

For the second condition in 7.6B.3.0.3 the test description is FFS.

7.6B.3.3.5 Test Requirement

For NR carrier same test requirement as in clause 7.6.3.5 in TS 38.521-1 [8] with the exceptions of uplink carrier output power as defined in 7.6B.3.3.3.

For E-UTRA carrier same test requirement as in clause 7.6.2.5 in TS 36.521-1 [10] with the exceptions of uplink carrier output power as defined in 7.6B.3.3.3.

7.6B.4 Narrow band blocking for EN-DC in FR1

7.6B.4.0 Minimum Conformance Requirements

7.6B.4.0.1 Intra-band contiguous EN-DC

Intra-band contiguous EN-DC narrow band blocking requirement and parameters are defined in Table 7.6B.4.0.1-1.

Table 7.6B.4.0.1-1: Narrow band blocking parameters for intra-band contiguous EN-DC

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			
	16			
P_{UW}, dBm (CW)	-55			
NOTE 1: Jammer offset is from Table 7.6.3.1A-1 in [5] and is applied from the lowest edge of the lowest carrier and the highest edge of the highest carrier. NOTE 2: For NR carrier, the transmitter shall be set to 4dB below $P_{CMAX\_L,f,c}$ at the minimum uplink configuration specified in Table 7.3.2-3 with $P_{CMAX\_L,f,c}$ as defined in subclause 6.2.4 from [2]. NOTE 3: For E-UTRA carrier, the transmitter shall be set to 4dB below $P_{CMAX\_L,c}$ at the minimum uplink configuration specified in Table 7.3.1-2 with $P_{CMAX\_L,c}$ as defined in subclause 6.2.5 for single carrier and in Table 7.3.1A-1 with P_{CMAX_L} as defined in subclause 6.2.5A for LTE-CA from [5]. NOTE 4: If NR carrier BW > 40M, no narrow band blocking requirements apply when blocker is applied at the edge of the NR carrier.				

The normative reference for this requirement is TS 38.101-3 [4] clause 7.6B.4.1.

7.6B.4.0.2 Intra-band non-contiguous EN-DC

For the E-TRA sub-block containing one or multiple CC's, the requirement is defined in sub-clause 7.6.3.1 for single carrier operation and in sub-clause 7.6.3.1A for CA in [5].

For the NR sub-block, the requirement is defined in sub-clause 7.6.4 in [2].

The blocker configuration is defined in the general sub-clause 7.1.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.6B.4.2.

7.6B.4.0.3 Inter-band EN-DC within FR1

Narrow band blocking requirement for E-UTRA single carrier and CA operation specified in sub-clauses 7.6.3.1 and 7.6.3.1A of [5] and for NR single carrier and CA operation specified in sub-clauses 7.6.4 and 7.6A.4 of [2] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.6B.4.3.

7.6B.4.0.4 Inter-band EN-DC including FR2

Narrow band blocking requirement for E-UTRA single carrier and CA operation specified in sub-clauses 7.6.3.1 and 7.6.3.1A of [5] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.6B.4.4.

7.6B.4.0.5 Inter-band EN-DC including both FR1 and FR2

Narrow band blocking requirement for E-UTRA single carrier and CA operation specified in sub-clauses 7.6.3.1 and 7.6.3.1A of [5] and for NR single carrier and CA operation specified in sub-clauses 7.6.4 and 7.6A.4 of [2] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.6B.4.5.

7.6B.4.1 Narrow band blocking for intra-band contiguous EN-DC (2 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- MU is TBD in Annex F
- UL RB allocation is TBD due to the missing table for UL configuration in 38.101-3

7.6B.4.1.1 Test Purpose

Verifies a receiver's ability to receive EN-DC signals at its assigned channel frequencies in the presence of an unwanted narrow band CW interferer at a frequency, which is less than the nominal channel spacing.

The lack of narrow-band blocking ability will decrease the coverage area when other NodeB transmitters exist (except in the adjacent channels and spurious response).

7.6B.4.1.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC in FR1.

7.6B.4.1.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6B.4.0.1.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

7.6B.4.1.4 Test Description

7.6B.4.1.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC configuration specified in clause 5.3B.1.2 and are shown in table 7.6B.4.1.4.1-1. The details of the uplink and downlink reference measurement channels (RMCs) are specified in Annex A.2 and A.3 respectively. The details of the OCNG patterns used are specified in TS 36.521-1 [10] Annex A.5 and in TS 38.521-1 [8] Annex A.5 for E-UTRA CG and NR CG respectively. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 7.6B.4.1.4.1-1: Test configuration table

Initial Conditions							
Test Environment as specified in TS 38.508-1 [6] subclause 4.1				Normal			
Test Frequencies as specified in TS38.508-1 [6] clause 4.3.1 for different EN-DC bandwidth classes				Mid range			
Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE				Lowest N_{RB_agg}, Highest N_{RB_agg} (NOTE 3)			
NR Test SCS as specified in Table 5.3.5-1 in TS 38.521-1[8]				Lowest SCS per Channel Bandwidth			
NR/E-UTRA Test Parameters							
Downlink Configuration				**Uplink Configuration**			
NR Modulation	**NR RB allocation**	**E-UTRA Modulation**	**E-UTRA RB allocation**	**NR Modulation**	**NR RB allocation**	**E-UTRA Modulation**	**E-UTRA RB allocation**
CP-OFDM QPSK	Full RB (NOTE 1)	QPSK	Full RB	DFT-s-OFDM QPSK	TBD	QPSK	TBD
NOTE 1: Full RB allocation shall be used per each SCS and channel BW as specified in Table 7.3.2.4.1-2 of TS 38.521-1[8]. NOTE 2: Test Channel Bandwidths are checked separately for each EN-DC band, which applicable channel bandwidths are specified in Table 5.3B.1.2-1. NOTE 3: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same N_{RB_agg} , only the combination with the highest NRB_SCG is tested.							

1. Connect the SS to the UE antenna connectors as shown in [6] TS 38.508-1 Annex A, in Figure [A.3.1.4.2] for SS diagram and section A.3.2 for UE diagram.

2. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] subclause 4.4.3.

3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C and TS 38.521-1 [8] Annex C for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.

4. The UL and DL Reference Measurement channels are TS 36.521-1 [10] Annex A.2, A.3 and TS 38.521-1 [8] Annex A.2 , A.3 for E-UTRA CG and NR CG respectively.

5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 7.6B.4.1.4.3.

7.6B.4.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A and PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.6B.4.1.4.1-1 on E-UTRA CC and NR CC respectively. The SS sends downlink MAC padding bits on the DL RMC.

2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according to table 7.6B.4.1.4.1-1 on E-UTRA CC and NR CC respectively. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

3. Set the Downlink signal level to the value as defined in Table 7.6B.4.1.5-1. Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that for at least the duration of the Throughput measurement:

   The E-UTRA CC output power is within $-P_W \pm P_W$ dB of (target level in Table 7.6B.4.1.5-1 + [10log(P_L_{CRB}/N_{RB_alloc})]). P_W is the power window according to Table 7.6B.4.1.5-2 for the carrier frequency f. The NR CC output power is within $-P_W \pm P_W$ dB of (target level in Table 7.6B.4.1.5-1 + [10log(S_L_{CRB}/N_{RB_alloc})]). P_W is the power window according to Table 7.6B.4.1.5-3 for the carrier frequency f and the channel bandwidth BW.

4. Set the parameters of the CW signal generator for an interfering signal below the aggregated component carriers according to Table 7.6B.4.1.5-1.

5. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex H.2.

6. Repeat steps from 4 to 5, using an interfering signal above the aggregated component carriers at step 4.

7.6B.4.1.4.3 Message contents

Message contents are according to TS 38.508-1 [6] subclause 4.6 Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED.

7.6B.4.1.5 Test Requirement

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in TS 36.521-1 [10] Annex A.3 and TS 38.521-1 [8] Annex A.3 for E-UTRA CG and NR CG respectively with parameters specified in Table 7.6B.4.1.5-1 for the specified wanted signal mean power in the presence of interfering signals.

Table 7.6B.4.1.5-1: Narrow band blocking for intra-band contiguous EN-DC

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			
	16			
P_{UW}, dBm (CW)	-55			
NOTE 1: Jammer offset is from Table 7.6.3.1A-1 in [5] and is applied from the lowest edge of the lowest carrier and the highest edge of the highest carrier. NOTE 2: For NR carrier, the transmitter shall be set to 4dB below $P_{CMAX\_L,f,c}$ at the minimum uplink configuration specified in Table 7.3.2-3 with $P_{CMAX\_L,f,c}$ as defined in subclause 6.2.4 from [2]. NOTE 3: For E-UTRA carrier, the transmitter shall be set to 4dB below $P_{CMAX\_L,c}$ at the minimum uplink configuration specified in Table 7.3.1-2 with $P_{CMAX\_L,c}$ as defined in subclause 6.2.5 for single carrier and in Table 7.3.1A-1 with P_{CMAX_L} as defined in subclause 6.2.5A for LTE-CA from [5]. NOTE 4: If NR carrier BW > 40M, no narrow band blocking requirements apply when blocker is applied at the edge of the NR carrier.				

Table 7.6B.4.1.5-2: Power Window (dB) for E-UTRA CC

f ≤ 3GHz	3GHz < f ≤ 4.2GHz
1.7	2.0
NOTE: Power Window comprises two parts, UE Power step tolerance and test system power measurement uncertainty.	

Table 7.6B.4.1.5-3: Power Window (dB) for NR CC

	f ≤ 3GHz	3GHz < f ≤ 4.2GHz	4.2GHz < f ≤ 6GHz
BW ≤ 20MHz	1.4	1.7	2.0
20MHz < BW ≤ 40MHz	1.4	1.7	2.2
40MHz < BW ≤ 100MHz	2.1	2.3	2.3
NOTE: Power Window comprises two parts, UE Power step tolerance and test system power measurement uncertainty.			

7.6B.4.2 Narrow band blocking for intra-band non-contiguous EN-DC (2 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- MU is TBD in Annex F
- MaxWGap is TBD

7.6B.4.2.1 Test Purpose

Same test purpose as in clause 7.6.4.1 in TS 38.521-1 [8] for the NR carrier.

7.6B.4.2.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC in FR1.

7.6B.4.2.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6B.4.0.2.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.6B.4.2.4 Test Description

Same test description as in clause 7.6.4.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

Table 7.6B.4.2.4-1: Test Configuration Table

Initial Conditions	
Test Frequencies as specified in TS38.508-1 [6] subclause 4.3.1 for different EN-DC bandwidth classes	[MaxWGap]
Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE	Highest N_{RB_agg} (NOTE1)
NOTE 1: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same NRB_agg , only the combination with the highest NRB_SCG is tested.	

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1 except for the parameters specified in Table 7.6B.4.2.4-1.

For Initial conditions as in clause 7.6.4.4.1 in TS 38.521-1 [8], add step 2.1 and step 3.1 as follows:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS36.521-1[10].

Step 6 of Initial conditions as in clause 7.6.4.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

Add step 7 to Initial conditions in clause 7.6.4.4.1 in TS 38.521-1 [8] as follows:

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.6B.4.2.5 Test Requirement

Same test requirement as in clause 7.6.4.5 in TS 38.521-1 [8].

7.6B.4.3 Narrow band blocking for inter-band EN-DC within FR1 (2 CCs)

7.6B.4.3.1 Test Purpose

Same test purpose as in clause 7.6.4.1 in TS 38.521-1 [8] for the NR carrier.

7.6B.4.3.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC within FR1.

7.6B.4.3.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.6B.4.0.3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.6B.4.3.4 Test Description

Same test description as in clause 7.6.4.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause 7.6.4.4.1 in TS 38.521-1 [8], add step 2.1 and step 3.1 as follows:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3.

3.1. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS36.521-1[10].

Step 6 of Initial conditions as in clause 7.6.4.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

Add step 7 to Initial conditions in clause 7.6.4.4.1 in TS 38.521-1 [8] as follows:

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

7.6B.4.3.5 Test Requirement

Same test requirement as in clause 7.6.4.5 in TS 38.521-1 [8].

7.7

7.7B Spurious response for EN-DC in FR1

7.7B.0 Minimum Conformance Requirements

7.7B.0.1 Intra-band contiguous EN-DC

Intra-band contiguous EN-DC spurious response requirement and parameters are defined in Table 7.7B.0.1-1.

Table 7.7B.0.1-1: Spurious Response Parameters for intra-band contiguous EN-DC

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			
	9			
$P_{interferer}$, dBm (CW)	-44			
NOTE 1: For NR carrier, the transmitter shall be set to 4dB below $P_{CMAX\_L,f,c}$ at the minimum uplink configuration specified in Table 7.3.2-3 with $P_{CMAX\_L,f,c}$ as defined in subclause 6.2.4 from [2]. NOTE 2: For E-UTRA carrier, the transmitter shall be set to 4dB below $P_{CMAX\_L,c}$ at the minimum uplink configuration specified in Table 7.3.1-2 with $P_{CMAX\_L,c}$ as defined in subclause 6.2.5 for single carrier and in Table 7.3.1A-1 with P_{CMAX_L} as defined in subclause 6.2.5A for LTE-CA from [5].				

The normative reference for this requirement is TS 38.101-3 [4] clause 7.7B.1.

7.7B.0.2 Intra-band non-contiguous EN-DC

For the E-UTRA sub-block containing one or multiple CC's, the requirement is defined in sub-clause 7.7.1 for single carrier operation and in sub-clause 7.7.1A for CA in [5].

For the NR sub-block, the requirement is defined in sub-clause 7.7 is [2].

The normative reference for this requirement is TS 38.101-3 [4] clause 7.7B.2.

7.7B.0.3 Inter-band EN-DC within FR1

Spurious response requirement for E-UTRA single carrier and CA operation specified in sub-clauses 7.7.1 and 7.7.1A of [5] and for NR single carrier and CA operation specified in sub-clauses 7.7 and 7.7A of [2] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.7B.3.

7.7B.0.4 Inter-band EN-DC including FR2

Spurious response requirement for E-UTRA single carrier and CA operation specified in sub-clauses 7.7.1 and 7.7.1A of [5] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.7B.4.

7.7B.0.5 Inter-band EN-DC including both FR1 and FR2

Spurious response requirement for E-UTRA single carrier and CA operation specified in sub-clauses 7.7.1 and 7.7.1A of [5] and for NR single carrier and CA operation specified in sub-clauses 7.7 and 7.7A of [2] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.7B.5.

7.7B.1 Spurious Response for intra-band contiguous EN-DC (2 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- MU is TBD in Annex F
- UL RB allocation is TBD due to the missing table for UL configuration in 38.101-3

7.7B.1.1 Test Purpose

Spurious response for EN-DC verifies the receiver's ability to receive a wanted aggregated signal on its assigned channel frequency without exceeding a given degradation due to the presence of an unwanted CW interfering signal at any other frequency at which a response is obtained i.e. for which the out of band blocking limit as specified in sub-clause 7.6B.3.1 is not met.

The lack of the spurious response ability decreases the coverage area when other unwanted interfering signal exists at any other frequency.

7.7B.1.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC in FR1.

7.7B.1.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.7B.0.1.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

7.7B.1.4 Test Description

7.7B.1.4.1 Initial condition

The initial conditions shall be the same as in clause 7.6B.3.1.4.1 in order to test spurious responses obtained in clause 7.6B.3.1 under the same conditions.

7.7B.1.4.2 Test procedure

1. SS transmits PDSCH via PDCCH DCI format 1A and PDCCH DCI format 1_1 for C_RNTI to transmit the DL RMC according to Table 7.6B.3.1.4.1-1 on E-UTRA CC and NR CC respectively. The SS sends downlink MAC padding bits on the DL RMC.

2. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according to table 7.6B.3.1.4.1-1 on E-UTRA CC and NR CC respectively. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

3. Set the Downlink signal level to the value as defined in Table 7.7B.1.5-1. Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that for at least the duration of the Throughput measurement:

The E-UTRA CC output power is within $-P_W \pm P_W$ dB of (target level in Table 7.7B.1.5-1 + [10log(P_L_{CRB}/N_{RB_alloc})]). P_W is the power window according to Table 7.7B.1.5-2 for the carrier frequency f. The NR CC output power is within $-P_W \pm P_W$ dB of (target level in Table 7.7B.1.5-1 + [10log(S_L_{CRB}/N_{RB_alloc})]). P_W is the power window according to Table 7.7B.1.5-3 for the carrier frequency f and the channel bandwidth BW.

4. Set the parameters of the CW signal generator for an interfering signal according to Table 7.7B.1.5-1. The spurious frequencies are taken from records in the final step of test procedures in clause 7.6B.3.1.4.2.

5. For each spurious frequency, Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex H.2.

7.7B.1.4.3 Message contents

Message contents are according to TS 38.508-1 [6] subclause 4.6 Table 4.6.3-118 with condition TRANSFORM_PRECODER_ENABLED.

7.7B.1.5 Test Requirement

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in TS 36.521-1 [10] Annex A.3 and TS 38.521-1 [8] Annex A.3 for E-UTRA CG and NR CG respectively with parameters specified in Table 7.7B.1.5-1 for the specified wanted signal mean power in the presence of interfering signals.

Table 7.7B.1.5-1: Spurious Response for intra-band contiguous EN-DC

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			
	9			
$P_{interferer}$, dBm (CW)	-44			
NOTE 1: For NR carrier, the transmitter shall be set to 4dB below $P_{CMAX\_L,f,c}$ at the minimum uplink configuration specified in Table 7.3.2-3 with $P_{CMAX\_L,f,c}$ as defined in subclause 6.2.4 from [2]. NOTE 2: For E-UTRA carrier, the transmitter shall be set to 4dB below $P_{CMAX\_L,c}$ at the minimum uplink configuration specified in Table 7.3.1-2 with $P_{CMAX\_L,c}$ as defined in subclause 6.2.5 for single carrier and in Table 7.3.1A-1 with P_{CMAX_L} as defined in subclause 6.2A for LTE-CA from [5].				

Table 7.7B.1.5-2: Power Window (dB) for E-UTRA CC

f ≤ 3GHz	3GHz < f ≤ 4.2GHz
1.7	2.0
NOTE: Power Window comprises two parts, UE Power step tolerance and test system power measurement uncertainty.	

Table 7.7B.1.5-3: Power Window (dB) for NR CC

	f ≤ 3GHz	3GHz < f ≤ 4.2GHz	4.2GHz < f ≤ 6GHz
BW ≤ 20MHz	1.4	1.7	2.0
20MHz < BW ≤ 40MHz	1.4	1.7	2.2
40MHz < BW ≤ 100MHz	2.1	2.3	2.3
NOTE: Power Window comprises two parts, UE Power step tolerance and test system power measurement uncertainty.			

7.7B.2 Spurious Response for intra-band non-contiguous EN-DC (2 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- MU is TBD in Annex F
- MaxWGap is TBD

7.7B.2.1 Test Purpose

Same test purpose as in clause 7.7.1 in TS 38.521-1 [8] for the NR carrier.

7.7B.2.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC in FR1.

7.7B.2.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.7B.0.2.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.7B.2.4 Test Description

Same test description as in clause 7.7.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial conditions shall be the same as the initial conditions in clause 7.6B.3.2.4 in order to test spurious responses obtained in clause 7.6B.3.2 under the same conditions.

7.7B.2.5 Test Requirement

Same test requirement as in clause 7.7.5 in TS 38.521-1 [8].

7.7B.3 Spurious Response for inter-band EN-DC within FR1 (2 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- Exceptions of uplink carrier output power is as defined in 7.6B.3.3.3. (Exceptions of uplink carrier output power is defined for OOBB in RAN4 spec but not defined for Spurious Response in RAN4 spec, uplink carrier output power should be defined the same way as OOBB.)

7.7B.3.1 Test Purpose

Same test purpose as in clause 7.7.1 in TS 38.521-1 [8] for the NR carrier.

7.7B.3.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC within FR1.

7.7B.3.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.7B.0.3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.7B.3.4 Test Description

For the first condition in 7.6B.3.3.3 the following test description applies:

Same test description as in clause 7.7.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial conditions shall be the same as the initial conditions in clause 7.6B.3.3.4 in order to test spurious responses obtained in clause 7.6B.3.3 under the same conditions.

Step 4 of Test Procedure as in clause 7.7.4.2 in TS 38.521-1 [8] is replaced by:

4. Set the NR downlink signal level according to the table 7.6.3.5-1 or 7.6.3.5-3 in TS 38.521-1 [8]. Send continuously uplink power control "down" commands in every uplink scheduling information to the UE; allow at least 200ms starting from the first TPC command in this step to ensure that the UE transmits at its minimum output power for at least the duration of the throughput measurement.

For the second condition in 7.6B.3.3.3 the test description is FFS.

7.7B.3.5 Test Requirement

Same test requirement as in clause 7.7.5 in TS 38.521-1 [8].

For NR carrier same test requirement as in clause 7.7.5 in TS 38.521-1 [8] with the exceptions of uplink carrier output power as defined in 7.6B.3.3.3.

For E-UTRA carrier same test requirement as in clause 7.7.5 in TS 36.521-1 [10] with the exceptions of uplink carrier output power as defined in 7.6B.3.3.3.

7.8 Intermodulation characteristics

7.8B Intermodulation characteristics for EN-DC in FR1

7.8B.1 General

7.8B.2 Wide band Intermodulation

7.8B.2.0 Minimum Conformance Requirements

7.8B.2.0.1 Intra-band contiguous EN-DC in FR1

Intra-band contiguous EN-DC wide band intermodulation requirement and parameters are defined in Table 7.8B.2.0.1-1.

Table 7.8B.2.0.1-1: Wide band intermodulation

EN-DC Aggregated Bandwidth, MHz	<=100	>100, <=120	>120, <=140	>140, <=160
Pw in Transmission Bandwidth Configuration, perCC, dBm	P_W [1]	16.8	17.5	18.0
$P_{interferer 1}$, dBm (CW)[2]	-46			
$P_{interferer 2}$, dBm (Modulated)[2]	-46			
NOTE 1: P_W is wanted signal power level from Table 7.8.1A-1 in [5] NOTE 2: Jammer BW and offsets is from Table 7.8.1A-1 [5] and is applied from the lowest edge of the lowest carrier and the highest edge of the highest carrier NOTE 3: For NR carrier, the transmitter shall be set to 4dB below $P_{CMAX\_L,f,c}$ at the minimum uplink configuration specified in Table 7.3-3 with $P_{CMAX\_L,f,c}$ as defined in subclause 6.2.4 from [2]. NOTE 4: For E-UTRA carrier, the transmitter shall be set to 4dB below $P_{CMAX\_L,c}$ at the minimum uplink configuration specified in Table 7.3-1-2 with $P_{CMAX\_L,c}$ as defined in subclause 6.2.5 for single carrier and in Table 7.3-1A-1 with P_{CMAX_L} as defined in subclause 6.2.5A for LTE-CA from [5].				

The normative reference for this requirement is TS 38.101-3 [4] clause 7.8B.2.1.

7.8B.2.0.2 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 sub-clause 7.8.1 for single carrier operation and in sub-clause 7.8.1A for CA in [5].

For the NR sub-block, the requirement is defined in sub-clause 7.8.2 in [2].

The blocker configuration is defined in the general sub-clause 7.1 and the requirement only apply for out of gap interferers.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.8B.2.2.

7.8B.2.0.3 Inter-band EN-DC within FR1

Wide band Intermodulation requirement for E-UTRA single carrier and CA operation specified in sub-clauses 7.8.1 and 7.8.1A of [5] and for NR single carrier and CA operation specified in sub-clauses 7.8.2 and 7.8A.2 of [2] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.8B.2.3.

7.8B.2.0.4 Inter-band EN-DC including FR2

Wide band Intermodulation requirement for E-UTRA single carrier and CA operation specified in sub-clauses 7.8.1 and 7.8.1A of [5] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.8B.2.4.

7.8B.2.0.5 Inter-band EN-DC including both FR1 and FR2

Wide band Intermodulation requirement for E-UTRA single carrier and CA operation specified in sub-clauses 7.8.1 and 7.8.1A of [5] and for NR single carrier and CA operation specified in sub-clauses 7.8.2 and 7.8A.2 of [2] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.8B.2.5.

7.8B.2.1 Wideband Intermodulation for intra-band contiguous EN-DC in FR1

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- UL Power window is TBD
- UL RB allocation is TBD due to the missing table for UL configuration in 38.101-3.

7.8B.2.1.1 Test Purpose

Intermodulation response tests the UE's ability to receive data with a given average throughput for a specified reference measurement channel, in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal, under conditions of ideal propagation and no added noise.

A UE unable to meet the throughput requirement under these conditions will decrease the coverage area when two or more interfering signals exist which have a specific frequency relationship to the wanted signal.

7.8B.2.1.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC within FR1.

7.8B.2.1.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.8B.2.0.

Exception requirements for both NR and E-UTRA are defined for this test and therefore LTE anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

7.8B.2.1.4 Test Description

7.8B.2.1.4.1 Initial condition

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies and channel bandwidths based on EN-DC operating bands specified in clause 5.3B.1.2, channel bandwidths and sub-carrier spacings for the NR cell specified in TS 38.521-1 [8] clause 5.3 and channel bandwidth for the E-UTRA cell are specified in TS 36.521-1 [10] clause 5.4.2. All of these configurations shall be tested with applicable test parameters for each EN-DC configuration specified in clause 5.3B.1.2 and are shown in table 7.8B.2.1.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in Annex A.2. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C.2 and in TS 38.521-1 [8] Annex C.2 for E-UTRA CG and NR CG respectively.

Table 7.8B.2.1.4.1-1: Test configuration table

Initial Conditions							
Test Environment as specified in TS 38.508-1 [6] subclause 4.1				Normal			
Test Frequencies as specified in TS38.508-1 [6] clause 4.3.1 for different EN-DC bandwidth classes				Mid range			
Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE				Lowest NRB_agg, Highest NRB_agg (NOTE 3)			
NR Test SCS as specified in Table 5.3.5-1 in TS 38.521-1[8]				Lowest SCS per Channel Bandwidth			
NR/E-UTRA Test Parameters							
Downlink Configuration				**Uplink Configuration**			
NR Modulation	**NR RB allocation**	**E-UTRA Modulation**	**E-UTRA RB allocation**	**NR Modulation**	**NR RB allocation**	**E-UTRA Modulation**	**E-UTRA RB allocation**
CP-OFDM QPSK	Full RB (NOTE 1)	QPSK	Full RB	DFT-s-OFDM QPSK	TBD	QPSK	TBD
NOTE 1: Full RB allocation shall be used per each SCS and channel BW as specified in Table 7.3.2.4.1-2 of TS 38.521-1[8]. NOTE 2: Test Channel Bandwidths are checked separately for each E-UTRA band, which applicable channel bandwidths are specified in Table 5.3B.1.2-1. NOTE 3: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same NRB_agg , only the combination with the highest NRB_SCG is tested.							

1. Connect the SS to the UE antenna connectors as shown in [6] TS 38.508-1 A.3.1.2.1 for SS diagram and A.3.2.1 for UE diagram.

2. The parameter settings for the E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3, and the parameter settings for the NR cell are set up according to TS 38.508-1 [6] subclause 4.4.3.

3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0 and TS 38.521-1 [8] Annex C.0 for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.

4. The UL Reference Measurement channels are TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.

5. Propagation conditions are set according to TS 36.521-1 [10] Annex B.0 and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.2B.1.1.4.3.

7.8B.2.1.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0_1 for C_RNTI to schedule the UL RMC according to table 7.8B.2.1.4.1-1 on E-UTRA CC and NR CC respectively. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC.

2. Set the Downlink signal level to the value as defined in Table 7.8B.2.1.5-1. Send Uplink power control commands to the UE (less or equal to 1dB step size should be used), to ensure that for at least the duration of the Throughput measurement:

   The E-UTRA CC output power is within [TBD] of (target level in Table 7.8B.2.1.5-1 + [10log(P_L_{CRB}/N_{RB_alloc})]).
   The NR CC output power is within ([TBD]) of (target level in Table 7.8B.2.1.5-1 + [10log(S_L_{CRB}/N_{RB_alloc})]).

3. Set the Interfering signal levels to the values as defined in Table 7.8B.2.1.5-1 and frequency below the wanted signal, using a modulated interferer bandwidth as defined in [TBD] of the present document.

4. Measure the average throughput for a duration sufficient to achieve statistical significance according to Annex G.2.

5. Repeat steps from 2 to 4, using an interfering signal above the wanted signal at step 3.

7.8B.2.1.4.3 Message contents

Message contents are according to TS 38.508-1 [5] subclause 4.6 with DFT-s-OFDM condition in Table 4.6.3-118 PUSCH-Config.

7.8B.2.1.5 Test Requirement

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.3.2 with parameters specified in Table 7.8B.2.1.5-1 for the specified wanted signal mean power in the presence of two interfering signals.

Table 7.8B.2.1.5-1: Wide band intermodulation

EN-DC Aggregated Bandwidth, MHz	<=100	>100, <=120	>120, <=140	>140, <=160
Pw in Transmission Bandwidth Configuration, perCC, dBm	P_W [1]	16.8	17.5	18.0
$P_{interferer\ 1}$, dBm (CW)[2]	-46			
$P_{interferer\ 2}$, dBm (Modulated)[2]	-46			
NOTE 1: P_W is wanted signal power level from Table 7.8.1A-1 in [5] NOTE 2: Jammer BW and offsets is from Table 7.8.1A-1 [5] and is applied from the lowest edge of the lowest carrier and the highest edge of the highest carrier NOTE 3: For NR carrier, the transmitter shall be set to 4dB below $P_{CMAX\_L,f,c}$ at the minimum uplink configuration specified in Table 7.3-3 with $P_{CMAX\_L,f,c}$ as defined in subclause 6.2.4 from [2]. NOTE 4: For E-UTRA carrier, the transmitter shall be set to 4dB below $P_{CMAX\_L,c}$ at the minimum uplink configuration specified in Table 7.3-1-2 with $P_{CMAX\_L,c}$ as defined in subclause 6.2.5 for single carrier and in Table 7.3-1A-1 with P_{CMAX_L} as defined in subclause 6.2.5A for LTE-CA from [5].				

Table 7.8B.2.1.5-2: Power Window (dB) for Wideband Intermodulation

	f ≤ 3GHz	3GHz < f ≤ 4.2GHz	4.2GHz < f ≤ 6GHz
BW ≤ 20MHz			
20MHz < BW ≤ 40MHz			
40MHz < BW ≤ 100MHz			

7.8B.2.2 Wideband Intermodulation for intra-band non-contiguous EN-DC in FR1

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- Referred corresponding SA TC in 38.521-1 is incomplete

7.8B.2.2.1 Test Purpose

Same test purpose as in clause 7.8.2.1 in TS 38.521-1 [8] for the NR carrier.

7.8B.2.2.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band non-contiguous EN-DC within FR1.

7.8B.2.2.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.8B.2.0.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.8B.2.2.4 Test Description

Same test description as in clause 7.8.2.4 in TS 38.521-1 [8] with the following exceptions:

Table 7.8B.2.2.4-1: Test Configuration Table

Initial Conditions	
Test Frequencies as specified in TS38.508-1 [6] subclause 4.3.1 for different EN-DC bandwidth classes	[MaxWGap]
Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE	Highest N_{RB_agg} (NOTE1)
NOTE 1: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same NRB_agg , only the combination with the highest NRB_SCG is tested.	

The initial test configurations for E-UTRA as specified in Table 4.6-1 except for the parameters specified in Table 7.9B.2.4-1.

For Initial conditions as in clause 7.8.2.4.1 in TS 38.521-1 [8], the following steps are added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS36.521-1[10].7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Step 6 of Initial conditions as in clause 7.8.2.4.2 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

Step 4 of Test procedure is replaced by:

4. Set the Interfering signal levels to the values as defined in Table 7.8.2.5-1 and frequency at the out-of-gap of the sub-blocks, using a modulated interferer bandwidth as defined in [TBD] of the present document.

Step 6 of Test procedure is removed.

7.8B.2.2.5 Test Requirement

Same test requirement as in clause 7.8.2.5 in TS 38.521-1 [8].

7.8B.2.3 Wideband Intermodulation for inter-band EN-DC in FR1 (2 CCs)

Editor's note: This clause is incomplete. The following aspects are either missing or not yet determined:

- Referred corresponding SA TC in 38.521-1 is incomplete

7.8B.2.3.1 Test Purpose

Same test purpose as in clause 7.8.2.1 in TS 38.521-1 [8] for the NR carrier.

7.8B.2.3.2 Test Applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC within FR1.

7.8B.2.3.3 Minimum Conformance Requirements

The minimum conformance requirements are defined in clause 7.8B.2.0.No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.8B.2.3.4 Test Description

Same test description as in clause 7.8.2.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause 7.8.2.4.1 in TS 38.521-1 [8], the following steps are added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS36.521-1[10].7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Step 6 of Initial conditions as in clause 7.8.2.4.2 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

7.8B.2.3.5 Test Requirement

Same test requirement as in clause 7.8.2.5 in TS 38.521-1 [8].

7.8B.2.4 Wideband Intermodulation for EN-DC including FR2 (2 CCs)

TBD

7.8B.2.5 Wideband Intermodulation for inter-band EN-DC including both FR1 and FR2 (3 CCs)

TBD

7.8B.2.6 Wideband Intermodulation for EN-DC including FR1 (3 CCs)

TBD

7.8B.2.7 Wideband Intermodulation for EN-DC including FR1 (4 CCs)

TBD

7.8B.2.8 Wideband Intermodulation for EN-DC including FR1 (5 CCs)

TBD

7.8B.2.9 Wideband Intermodulation for EN-DC including FR1 (6 CCs)

TBD

7.9 Spurious emissions

7.9B Spurious emissions for EN-DC in FR1

7.9B.0 Minimum Conformance Requirements

7.9B.0.1 Intra-band contiguous EN-DC in FR1

The requirement is defined in sub-clause 7.9A.1 in [2].

The normative reference for this requirement is TS 38.101-3 [4] clause 7.9B.1.

7.9B.0.2 Intra-band non-contiguous EN-DC in FR1

Spurious emissions requirement for E-UTRA single carrier and CA operation specified in sub-clauses 7.9.1 and 7.9.1A of [5] and for NR single carrier and CA operation specified in sub-clauses 7.9 and 7.9A of [2] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.9B.2.

7.9B.0.3 Inter-band EN-DC within FR1

E-UTRA requirements from TS 36.101 [5] and NR requirements from TS 38.101-1 [2] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.9B.3.

7.9B.0.4 Inter-band EN-DC including FR2

Spurious emissions requirement for E-UTRA single carrier and CA operation specified in sub-clauses 7.9.1 and 7.9.1A of [5] and for NR single carrier and CA operation specified in sub-clause 7.9 of [3] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.9B.4.

7.9B.0.5 Inter-band EN-DC including both FR1 and FR2

Spurious emissions requirement for E-UTRA single carrier and CA operation specified in sub-clauses 7.9.1 and 7.9.1A of [5] and for NR single carrier and CA operation specified in sub-clauses 7.9 and 7.9A of [2] and [3] apply.

The normative reference for this requirement is TS 38.101-3 [4] clause 7.9B.5.

7.9B.1 Spurious Emissions for intra-band contiguous EN-DC in FR1(2 CCs)

7.9B.1.1 Test purpose

Same test purpose as in clause 7.9.1 in TS 38.521-1 [8] for the NR carrier.

7.9B.1.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting intra-band contiguous EN-DC within FR1.

7.9B.1.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.9B.0.3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.9B.1.4 Test description

Same test description as in clause 7.9.4 in TS 38.521-1 [8] with the following exceptions:

Table 7.9B.1.4-1: Test Configuration Table

Initial Conditions	
Test Frequencies as specified in TS38.508-1 [6] subclause 4.3.1 for different DC bandwidth classes.	Mid range
Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE	Highest N_{RB_agg} (NOTE 1)
NOTE 1: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same NRB_agg , only the combination with the highest NRB_SCG is tested.	

The initial test configurations for E-UTRA as specified in Table 4.6-1 except for the parameters specified in Table 7.9B.1.4-1.

For Initial conditions as in clause 7.9.4.1 in TS 38.521-1 [8], the following steps are added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS36.521-1[10].

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Step 6 of Initial conditions as in clause 7.9.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

7.9B.1.5 Test requirement

Same test requirement as in clause 7.9.5 in TS 38.521-1 [8].

7.9B.2 Spurious Emissions for intra-band non-contiguous EN-DC in FR1(2 CCs)

7.9B.2.1 Test purpose

Same test purpose as in clause 7.9.1 in TS 38.521-1 [8] for the NR carrier.

7.9B.2.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC within FR1.

7.9B.2.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.9B.0.3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.9B.2.4 Test description

Same test description as in clause 7.9.4 in TS 38.521-1 [8] with the following exceptions:

Table 7.9B.2.4-1: Test Configuration Table

Initial Conditions	
Test Frequencies as specified in TS38.508-1 [6] subclause 4.3.1 for different DC bandwidth classes	[MaxWGap]
Test EN-DC bandwidth combination as specified in Table 5.3B.1.2-1 across bandwidth combination sets supported by the UE	Highest N_{RB_agg} (NOTE 1)
NOTE 1: If the UE supports multiple CC Combinations in the EN-DC Configuration with the same NRB_agg , only the combination with the highest NRB_SCG is tested.	

The initial test configurations for E-UTRA as specified in Table 4.6-1 except for the parameters specified in Table 7.9B.2.4-1.

For Initial conditions as in clause 7.9.4.1 in TS 38.521-1 [8], the following steps are added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS36.521-1[10].

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Step 6 of Initial conditions as in clause 7.9.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

7.9B.2.5 Test requirement

Same test requirement as in clause 7.9.5 in TS 38.521-1 [8].

7.9B.3 Spurious Emissions for inter-band EN-DC within FR1(2 CCs)

7.9B.3.1 Test purpose

Same test purpose as in clause 7.9.1 in TS 38.521-1 [8] for the NR carrier.

7.9B.3.2 Test applicability

This test case applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC within FR1.

7.9B.3.3 Minimum conformance requirements

The minimum conformance requirements are defined in clause 7.9B.0.3.

No exception requirements applicable to NR or LTE. LTE anchor agnostic approach is applied.

7.9B.3.4 Test description

Same test description as in clause 7.9.4 in TS 38.521-1 [8] for the NR carrier with the following exceptions:

The initial test configurations for E-UTRA consist of test frequency based on E-UTRA operating band and test channel bandwidth as specified in Table 4.6-1.

For Initial conditions as in clause 7.9.4.1 in TS 38.521-1 [8], the following steps are added to configure E-UTRA component:

2.1. The parameter settings for E-UTRA cell are set up according to TS 36.508 [11] subclause 4.4.3. The E-UTRA downlink signal level, uplink signal level are set according to Table 4.6-1 and propagation conditions are set according to Annex B.0 of TS36.521-1[10].

7. On the E-UTRA carrier, disable periodic and aperiodic CQI reports, disable SRS, set TimeAlignmentTimerDedicated IE to infinity and disable downlink and uplink scheduling, all as per Table 4.6-1 under clause 4.6.

Step 6 of Initial conditions as in clause 7.9.4.1 in TS 38.521-1 [8] is replaced by:

6. Ensure the UE is in state RRC_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer MCG and SCG, Connected without release *On* according to TS 38.508 [6] clause 4.5.

7.9B.3.5 Test requirement

Same test requirement as in clause 7.9.5 in TS 38.521-1 [8].

7.9B.4 Spurious Emissions for inter-band EN-DC including FR2 (2 CCs)

TBD

7.9B.5 Spurious Emissions for inter-band EN-DC including both FR1 and FR2 (3 CCs)

TBD

7.9B.6 Spurious Emissions for EN-DC (3 CCs)

TBD

7.9B.7 Spurious Emissions for EN-DC (4 CCs)

TBD

7.9B.8 Spurious Emissions for EN-DC (5 CCs)

TBD

7.9B.9 Spurious Emissions for EN-DC (6 CCs)

TBD

Annex A (normative): Measurement Channels

Please refer to Annex A in TS 38.521-1 [8] and 38.521-2 [9] for appropriate details as needed for test cases in this test specification. EN-DC exceptions will be added.

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 subclauses 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 [13] Note 3: As per Table 4.2-1 in TS 36.211 [13]							

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					
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 [13] Note 3: As per Table 4.2-1 in TS 36.211 [13]							

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					
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 [13] Note 3: As per Table 4.2-1 in TS 36.211 [13] 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					
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 [13] Note 3: As per Table 4.2-1 in TS 36.211 [13]							

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 [13]
Note 3: As per Table 4.2-1 in TS 36.211 [13]

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 [13]
Note 3: As per Table 4.2-1 in TS 36.211 [13]

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	Trans-port 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)	UE UL 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	5, 8, 13, 14
	1.4 - 20	2	2	7	12	64QAM	3/4	1256	24	1	1728	288	5,8	5, 8, 13, 14
	1.4 - 20	3	2	7	12	64QAM	3/4	1864	24	1	2592	432	5,8	5, 8, 13, 14
	1.4 - 20	4	2	7	12	64QAM	3/4	2536	24	1	3456	576	5,8	5, 8, 13, 14
	1.4 - 20	5	2	7	12	64QAM	3/4	3112	24	1	4320	720	5,8	5, 8, 13, 14
	3-20	6	2	7	12	64QAM	3/4	3752	24	1	5184	864	5,8	5, 8, 13, 14
	3-20	8	2	7	12	64QAM	3/4	5160	24	1	6912	1152	5,8	5, 8, 13, 14
	3-20	9	2	7	12	64QAM	3/4	5736	24	1	7776	1296	5,8	5, 8, 13, 14
	3-20	10	2	7	12	64QAM	3/4	6200	24	2	8640	1440	5,8	5, 8, 13, 14
	3-20	12	2	7	12	64QAM	3/4	7480	24	2	10368	1728	5,8	5, 8, 13, 14
	5-20	15	2	7	12	64QAM	3/4	9528	24	2	12960	2160	5,8	5, 8, 13, 14
	5-20	16	2	7	12	64QAM	3/4	10296	24	2	13824	2304	5,8	5, 8, 13, 14
	5-20	18	2	7	12	64QAM	3/4	11448	24	2	15552	2592	5,8	5, 8, 13, 14
	5-20	20	2	7	12	64QAM	3/4	12576	24	3	17280	2880	5,8	5, 8, 13, 14
	5-20	24	2	7	12	64QAM	3/4	15264	24	3	20736	3456	5,8	5, 8, 13, 14
	10-20	25	2	7	12	64QAM	3/4	15840	24	3	21600	3600	5,8	5, 8, 13, 14
	10-20	27	2	7	12	64QAM	3/4	16992	24	3	23328	3888	5,8	5, 8, 13, 14
	10-20	30	2	7	12	64QAM	3/4	19080	24	4	25920	4320	5,8	5, 8, 13, 14
	10-20	32	2	7	12	64QAM	3/4	20616	24	4	27648	4608	5,8	5, 8, 13, 14
	10-20	36	2	7	12	64QAM	3/4	22920	24	4	31104	5184	5,8	5, 8, 13, 14
	10-20	40	2	7	12	64QAM	3/4	25456	24	5	34560	5760	5,8	5, 8, 13, 14

	10-20	45	2	7	12	64QAM	3/4	28336	24	5	38880	6480	5,8	5, 8, 13, 14
	10-20	48	2	7	12	64QAM	3/4	30576	24	5	41472	6912	5,8	5, 8, 13, 14
	15 - 20	50	2	7	12	64QAM	3/4	31704	24	6	43200	7200	5,8	5, 8, 13, 14
	15 - 20	54	2	7	12	64QAM	3/4	34008	24	6	46656	7776	5,8	5, 8, 13, 14
	15 - 20	60	2	7	12	64QAM	3/4	37888	24	7	51840	8640	5,8	5, 8, 13, 14
	15 - 20	64	2	7	12	64QAM	3/4	40576	24	7	55296	9216	5,8	5, 8, 13, 14
	15 - 20	72	2	7	12	64QAM	3/4	45352	24	8	62208	10368	5,8	5, 8, 13, 14
	20	75	2	7	12	64QAM	3/4	46888	24	8	64800	10800	5,8	5, 8, 13, 14
	20	80	2	7	12	64QAM	3/4	51024	24	9	69120	11520	5,8	5, 8, 13, 14
	20	81	2	7	12	64QAM	3/4	51024	24	9	69984	11664	5,8	5, 8, 13, 14
	20	90	2	7	12	64QAM	3/4	51024	24	9	77760	12960	5,8	5, 8, 13, 14
	20	96	2	7	12	64QAM	3/4	61664	24	11	82944	13824	5,8	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 [13]
Note 3: As per Table 4.2-1 in TS 36.211 [13]
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	Trans-port 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 U Categ
Unit	MHz							Bits	Bits		Bits		
	1.4 - 20	1	2	7	12	256QAM	3/4	840	24	1	1152	144	≥ 1
	1.4 - 20	2	2	7	12	256QAM	3/4	1672	24	1	2304	288	≥ 1
	1.4 - 20	3	2	7	12	256QAM	3/4	2536	24	1	3456	432	≥ 1
	1.4 - 20	4	2	7	12	256QAM	3/4	3368	24	1	4608	576	≥ 1
	1.4 - 20	5	2	7	12	256QAM	3/4	4264	24	1	5760	720	≥ 1
	3-20	6	2	7	12	256QAM	3/4	5160	24	1	6912	864	≥ 1
	3-20	8	2	7	12	256QAM	3/4	6712	24	2	9216	1152	≥ 1
	3-20	9	2	7	12	256QAM	3/4	7736	24	2	10368	1296	≥ 1
	3-20	10	2	7	12	256QAM	3/4	8504	24	2	11520	1440	≥ 1
	3-20	12	2	7	12	256QAM	3/4	10296	24	2	13824	1728	≥ 1
	5-20	15	2	7	12	256QAM	3/4	12960	24	3	17280	2160	≥ 1
	5-20	16	2	7	12	256QAM	3/4	13536	24	3	18432	2304	≥ 1
	5-20	18	2	7	12	256QAM	3/4	15264	24	3	20736	2592	≥ 1
	5-20	20	2	7	12	256QAM	3/4	16992	24	3	23040	2880	≥ 1
	5-20	24	2	7	12	256QAM	3/4	20616	24	4	27648	3456	≥ 1
	10-20	25	2	7	12	256QAM	3/4	21384	24	4	28800	3600	≥ 1
	10-20	27	2	7	12	256QAM	3/4	22920	24	4	31104	3888	≥ 1
	10-20	30	2	7	12	256QAM	3/4	25456	24	5	34560	4320	≥ 1
	10-20	32	2	7	12	256QAM	3/4	27376	24	5	36864	4608	≥ 1
	10-20	36	2	7	12	256QAM	3/4	30576	24	6	41472	5184	≥ 1
	10-20	40	2	7	12	256QAM	3/4	34008	24	6	46080	5760	≥ 1
	10-20	45	2	7	12	256QAM	3/4	37888	24	7	51840	6480	≥ 1
	10-20	48	2	7	12	256QAM	3/4	40576	24	8	55296	6912	≥ 1
	15 - 20	50	2	7	12	256QAM	3/4	42368	24	8	57600	7200	≥ 1
	15 - 20	54	2	7	12	256QAM	3/4	46888	24	8	62208	7776	≥ 1
	15 - 20	60	2	7	12	256QAM	3/4	51024	24	9	69120	8640	≥ 1
	15 - 20	64	2	7	12	256QAM	3/4	55056	24	9	73728	9216	≥ 1
	15 - 20	72	2	7	12	256QAM	3/4	61664	24	11	82944	10368	≥ 1
	20	75	2	7	12	256QAM	3/4	63776	24	11	86400	10800	≥ 1
	20	80	2	7	12	256QAM	3/4	68808	24	12	92160	11520	≥ 1
	20	81	2	7	12	256QAM	3/4	68808	24	12	93312	11664	≥ 1
	20	90	2	7	12	256QAM	3/4	76208	24	13	103680	12960	≥ 1
	20	96	2	7	12	256QAM	3/4	81176	24	14	110592	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 Bi

Note 2: As per Table 4.2-2 in TS 36.211 [13]

Note 3: As per Table 4.2-1 in TS 36.211 [13]

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,

$$\min\left|R-(A+24*(N_{CB}+1))/N_{ch}\right|, \textit{ where } N_{CB}=\begin{cases}0, \textit{if } C=1\\ C, \textit{if } C>1\end{cases},$$

subject to

a) A is a valid TB size according to section 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 section 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

Annex B (normative): Propagation Conditions

Please refer to Annex B in TS 38.521-1 [8] and 38.521-2 [9] for appropriate details as needed for test cases in this test specification. EN-DC exceptions will be added,

Annex C (normative): Downlink Physical Channels

Please refer to Annex C in TS 38.521-1 [8] and 38.521-2 [9] for appropriate details as needed for test cases in this test specification. EN-DC exceptions will be added,

Annex D (normative): Characteristics of the Interfering Signal

Please refer to Annex D in TS 38.521-1 [8] and 38.521-2 [9] for appropriate details as needed for test cases in this test specification. EN-DC exceptions will be added,

Annex E (normative): Global In-Channel Tx Test

Please refer to Annex E in TS 38.521-1 [8] and 38.521-2 [9] for appropriate details as needed for test cases in this test specification. EN-DC exceptions will be added,

Annex F (informative): Measurement uncertainties and Test Tolerances

F.1 Acceptable uncertainty of Test System (normative)

TBD

F.1.1 Measurement of test environments

TBD

F.1.2 Measurement of transmitter

Table F.1.2-1: Maximum Test System Uncertainty for transmitter tests

Subclause	Maximum Test System Uncertainty	Derivation of Test System Uncertainty
6.2B.1.1 UE Maximum Output Power for Intra-Band Contiguous EN-DC	f ≤ 3.0GHz ±0.7 dB, BW ≤ 40MHz ±1.4 dB, 40MHz < BW ≤ 100MHz 3.0GHz < f ≤ 4.2GHz ±1.0 dB, BW ≤ 40MHz ±1.6 dB, 40MHz < BW ≤ 100MHz 4.2GHz < f ≤ 6.0GHz ±1.3 dB, BW ≤ 20MHz ±1.5 dB, 20MHz < BW ≤ 40MHz ±1.6 dB, 40MHz < BW ≤ 100MHz	
6.2B.1.4 UE Maximum Output Power for Inter-Band EN-DC including FR2	Same as 6.2.1 in TS 38.521-2	
6.2B.1.2 UE Maximum Output Power for Intra-Band Non-Contiguous EN-DC	(LTE: f ≤ 3.0GHz) NR: f ≤ 3.0GHz ±1.0 dB, BW_{NR} ≤ 40MHz ±1.6 dB, 40MHz < BW_{NR} ≤ 100MHz NR: 3.0GHz < f ≤ 4.2GHz ±1.2 dB, BW_{NR} ≤ 40MHz ±1.7 dB, 40MHz < BW_{NR} ≤ 100MHz NR: 4.2GHz < f ≤ 6.0GHz ±1.5 dB, BW_{NR} ≤ 40MHz ±1.7 dB, 40MHz < BW_{NR} ≤ 100MHz (LTE: 3.0GHz < f ≤ 4.2GHz) NR: f ≤ 3.0GHz ±1.2 dB, BW_{NR} ≤ 40MHz ±1.7 dB, 40MHz < BW_{NR} ≤ 100MHz NR: 3.0GHz < f ≤ 4.2GHz ±1.4 dB, BW_{NR} ≤ 40MHz ±1.9 dB, 40MHz < BW_{NR} ≤ 100MHz NR: 4.2GHz < f ≤ 6.0GHz ±1.6 dB, BW_{NR} ≤ 20MHz ±1.8 dB, 20MHz < BW_{NR} ≤ 40MHz ±1.9 dB, 40MHz < BW_{NR} ≤ 100MHz	

6.2B.1.3 UE Maximum Output Power for Inter-Band EN-DC within FR1	(LTE: f ≤ 3.0GHz) NR: f ≤ 3.0GHz ±1.0 dB, BW_{NR} ≤ 40MHz ±1.6 dB, 40MHz < BW_{NR} ≤ 100MHz NR: 3.0GHz < f ≤ 4.2GHz ±1.2 dB, BW_{NR} ≤ 40MHz ±1.7 dB, 40MHz < BW_{NR} ≤ 100MHz NR: 4.2GHz < f ≤ 6.0GHz ±1.5 dB, BW_{NR} ≤ 40MHz ±1.7 dB, 40MHz < BW_{NR} ≤ 100MHz (LTE: 3.0GHz < f ≤ 4.2GHz) NR: f ≤ 3.0GHz ±1.2 dB, BW_{NR} ≤ 40MHz ±1.7 dB, 40MHz < BW_{NR} ≤ 100MHz NR: 3.0GHz < f ≤ 4.2GHz ±1.4 dB, BW_{NR} ≤ 40MHz ±1.9 dB, 40MHz < BW_{NR} ≤ 100MHz NR: 4.2GHz < f ≤ 6.0GHz ±1.6 dB, BW_{NR} ≤ 20MHz ±1.8 dB, 20MHz < BW_{NR} ≤ 40MHz ±1.9 dB, 40MHz < BW_{NR} ≤ 100MHz	
6.2B.2.1 UE Maximum Output Power reduction for Intra-Band Contiguous EN-DC	Same as 6.2B.1.1	
6.2B.2.2 UE Maximum Output Power reduction for Intra-Band Non-Contiguous EN-DC	Same as 6.2B.1.2	
6.2B.2.3 UE Maximum Output Power reduction for Inter-Band EN-DC within FR1	Same as 6.2B.1.3	
6.2B.3.1 UE Additional Maximum Output Power reduction for Intra-band contiguous EN-DC	Same as 6.2B.1.1	
6.2B.3.2 UE Additional Maximum Output Power reduction for Intra-Band Non-Contiguous EN-DC	Same as 6.2B.1.2	
6.2B.3.3 UE Additional Maximum Output Power reduction for Inter-Band EN-DC within FR1	Same as 6.2B.1.3	
6.2B.4.1.1 Configured Output Power Level for Intra-Band Contiguous EN-DC	Same as 6.2B.1.1	
6.2B.4.1.2 Configured Output Power for Intra-Band Non-Contiguous EN-DC	Same as 6.2B.1.2	
6.2B.4.1.3 Configured Output Power for Inter-Band EN-DC within FR1	Same as 6.2B.1.3	
6.3B.1.1 Minimum Output Power for intra-band contiguous EN-DC	Same as 6.3.1 in TS 38.521-1	
6.3B.1.2 Minimum output power for intra-band non-contiguous EN-DC	Same as 6.3.1 in TS 38.521-1	

6.3B.1.3 Minimum output power for inter-band EN-DC within FR1	Same as 6.3.1 in TS 38.521-1	
6.3B.1.4 Minimum Output Power for EN-DC Interband including FR2	Same as 6.3.1 in TS 38.521-1	
6.3B.2.1 Transmit OFF Power for intra-band contiguous EN-DC	Same as 6.3.2 in TS 38.521-1	
6.3B.2.2 Transmit OFF Power for intra-band non-contiguous EN-DC	Same as 6.3.2 in TS 38.521-1	
6.3B.2.3 Transmit OFF Power for inter-band EN-DC within FR1	Same as 6.3.2 in TS 38.521-1	
6.3B.3.1 Tx ON/OFF time mask for intra-band contiguous EN-DC	Same as 6.3.3 in TS 38.521-1	
6.3B.3.2 Tx ON/OFF time mask for intra-band non-contiguous EN-DC	Same as 6.3.3 in TS 38.521-1	
6.3B.3.3 Tx ON/OFF time mask for inter-band EN-DC within FR1	Same as 6.3.3 in TS 38.521-1	
6.4B.1.1 Frequency Error for intra-band contiguous EN-DC	TBD	
6.4B.1.2 Frequency Error for intra-band non-contiguous EN-DC	TBD	
6.4B.1.3 Frequency Error for inter-band EN-DC within FR1	Same as 6.4.1 in TS 38.521-1	
6.4B.1.5 Frequency Error for inter-band EN-DC including FR2	Same as 6.4.1 in TS 38.521-2	
6.4B.2.1.1 Error Vector Magnitude for intra-band contiguous EN-DC	TBD	
6.4B.2.1.2 Carrier Leakage for intra-band contiguous EN-DC	TBD	
6.4B.2.1.3 In-band Emissions for intra-band contiguous EN-DC	TBD	
6.4B.2.1.4 EVM Equalizer Flatness for intra-band contiguous EN-DC	TBD	
6.4B.2.2.1 Error Vector Magnitude for intra-band non-contiguous EN-DC	TBD	
6.4B.2.2.2 Carrier Leakage for intra-band non-contiguous EN-DC	TBD	
6.4B.2.2.3 In-band Emissions for intra-band non-contiguous EN-DC	TBD	
6.4B.2.2.4 EVM Equalizer Flatness for intra-band non-contiguous EN-DC	TBD	
6.4B.2.3.1 Error Vector Magnitude for inter-band EN-DC within FR1	Same as 6.4.2.1 in TS 38.521-1	
6.4B.2.3.2 Carrier Leakage for inter-band EN-DC within FR1	Same as 6.4.2.2 in TS 38.521-1	

6.4B.2.3.3 In-band Emissions for inter-band EN-DC within FR1	Same as 6.4.2.3 in TS 38.521-1	
6.4B.2.3.4 EVM Equalizer Flatness for inter-band EN-DC within FR1	Same as 6.4.2.4 in TS 38.521-1	
6.4B.2.4.1 Error Vector Magnitude for inter-band EN-DC including FR2	Same as 6.4.2.1 in TS 38.521-2	
6.4B.2.4.2 Carrier Leakage for inter-band EN-DC including FR2	Same as 6.4.2.2 in TS 38.521-2	
6.4B.2.4.3 In-band Emissions for inter-band EN-DC including FR2	Same as 6.4.2.3 in TS 38.521-2	
6.4B.2.4.4 EVM Equalizer Flatnessfor inter-band EN-DC including FR2	Same as 6.4.2.4 in TS 38.521-2	
6.5B.1.1 Occupied bandwidth for Intra-Band Contiguous EN-DC	1.5% of aggregated channel bandwidth	
6.5B.1.2 Occupied bandwidth for Intra-Band Non-Contiguous EN-DC	Same as 6.5.1 in TS 38.521-1	
6.5B.1.3 Occupied bandwidth for Inter-Band EN-DC within FR1	Same as 6.5.1 in TS 38.521-1	
6.5B.2.1.1 Spectrum emissions mask for intra-band contiguous EN-DC	Same as 6.5.2.2 in TS 38.521-1	
6.5B.2.1.2 Additional spectrum emissions mask for intra-band contiguous EN-DC	Same as 6.5.2.3 in TS 38.521-1	
6.5B.2.1.3 Adjacent channel leakage ratio for intra-band contiguous EN-DC	Same as 6.5.2.3 in TS 38.521-1	
6.5B.1.4 Occupied bandwidth for Inter-Band EN-DC including FR2	Same as 6.5.1 in TS 38.521-2	
6.5B.2.2.1 Spectrum emissions mask for intra-band non-contiguous EN-DC	Same as 6.5.2.2 in TS 38.521-1	
6.5B.2.2.2 Additional Spectrum emissions mask for intra-band non-contiguous EN-DC	Same as 6.5.2.3 in TS 38.521-1	
6.5B.2.2.3 Adjacent channel leakage ratio for intra-band non-contiguous EN-DC	TBD	
6.5B.2.3.1 Spectrum emissions mask for Inter-band EN-DC within FR1	Same as 6.5.2.2 in TS 38.521-1	
6.5B.2.3.2 Additional Spectrum emissions mask for Inter-band EN-DC within FR1	Same as 6.5.2.3 in TS 38.521-1	
6.5B.2.3.3 Adjacent channel leakage ratio for inter-band EN-DC within FR1	Same as 6.5.2.4.1 in TS 38.521-1	
6.5B.2.4.1 Spectrum emissions mask for Inter-band EN-DC including FR2	Same as 6.5.2.1 in TS 38.521-2	
6.5B.2.4.3 Adjacent channel leakage ratio for Inter-band EN-DC including FR2	Same as 6.5.2.3 in TS 38.521-2	

6.5B.3.1.1 General spurious emissions for intra-band contiguous EN-DC	Same as 6.5.3.1 in TS 38.521-1	
6.5B.3.1.2 Spurious emission band UE co-existence for intra-band contiguous EN-DC	Same as 6.5.3.1 in TS 38.521-1	
6.5B.3.2.1 General spurious emissions for Intra-band non-contiguous EN-DC	Same as 6.5.3.1 in TS 38.521-1	
6.5B.3.2.2 Spurious Emission band UE co-existence for intra-band non-contiguous EN-DC	Same as 6.5.3.1 in TS 38.521-1	
6.5B.3.3.1 General spurious emissions for Inter-band EN-DC within FR1	Same as 6.5.3.1 in TS 38.521-1	
6.5B.3.3.2 Spurious emission band UE co-existence for Inter-band within FR1	Same as 6.5.3.1 in TS 38.521-1	
6.5B.3.4.2 Spurious emission band UE co-existence for Inter-band including FR2	Same as 6.5.3.2 in TS 38.521-2	
6.5B.5.3 Transmit intermodulation for Inter-band EN-DC within FR1	Same as 6.5.4.3 in TS 38.521-1	

F.1.3 Measurement of receiver

Table F.1.3-1: Maximum Test System Uncertainty for receiver tests

Subclause	Maximum Test System Uncertainty	Derivation of Test System Uncertainty
7.3B.2.1 Reference sensitivity for Intra-band Contiguous EN-DC	Same as 7.3.2 in TS 38.521-1	
7.3B.2.2 Reference sensitivity for Intra-band non-contiguous EN-DC	Same as 7.3.2 in TS 38.521-1	
7.3B.2.3 Reference sensitivity for Inter-band EN-DC within FR1	Same as 7.3.2 in TS 38.521-1	
7.4B.1 Maximum Input Level for Intra-Band Contiguous EN-DC	Same as 7.4 in TS 38.521-1	
7.4B.2 Maximum Input Level for Intra-Band Non-Contiguous EN-DC	Same as 7.4 in TS 38.521-1	
7.4B.3 Maximum Input Level for Inter-band EN-DC within FR1	Same as 7.4 in TS 38.521-1	
7.5B.1 Adjacent Channel Selectivity for intra-band contiguous EN-DC	TBD	
7.5B.2 Adjacent Channel Selectivity for intra-band non-contiguous EN-DC	TBD	
7.5B.3 Adjacent Channel Selectivity for inter-band EN-DC within FR1	Same as 7.5 in TS 38.521-1	
7.6B.2.1 Inband blocking for intra-band contiguous EN-DC in FR1	TBD	
7.6B.2.2 Inband blocking for intra-band non-contiguous EN-DC in FR1	TBD	
7.6B.2.3 Inband blocking for inter-band EN-DC within FR1	Same as 7.6.2 in TS 38.521-1	
7.6B.3.1 Out-of-band blocking for intra-band contiguous EN-DC in FR1	TBD	
7.6B.3.2 Out-of-band blocking for intra-band non-contiguous EN-DC in FR1	TBD	
7.6B.3.3 Out-of-band blocking for inter-band EN-DC within FR1	Same as 7.6.3 in TS 38.521-1	
7.6B.4.1 Narrow band blocking for intra-band contiguous EN-DC in FR1	TBD	
7.6B.4.2 Narrow band blocking for intra-band non-contiguous EN-DC in FR1	TBD	
7.6B.4.3 Narrow band blocking for inter-band EN-DC within FR1	Same as 7.6.4 in TS 38.521-1	
7.7B.1 Spurious Response for intra-band contiguous EN-DC in FR1	TBD	
7.7B.2 Spurious Response for intra-band non-contiguous EN-DC in FR1	TBD	
7.7B.3 Spurious Response for inter-band EN-DC within FR1	Same as 7.7 in TS 38.521-1	

7.8B.2.1 Wideband Intermodulation for intra-band contiguous EN-DC in FR1	Same as 7.8.2 in TS 38.521-1	
7.8B.2.2 Wideband Intermodulation for intra-band non-contiguous EN-DC in FR1	Same as 7.8.2 in TS 38.521-1	
7.8B.2.3 Wideband Intermodulation for inter-band EN-DC within FR1	Same as 7.8.2 in TS 38.521-1	
7.9B.1 Spurious Emissions for intra-band contiguous EN-DC within FR1	Same as 7.9 in TS 38.521-1	
7.9B.2 Spurious Emissions for intra-band non-contiguous EN-DC within FR1	Same as 7.9 in TS 38.521-1	
7.9B.3 Spurious Emissions for inter-band EN-DC within FR1	Same as 7.9 in TS 38.521-1	

F.2 Interpretation of measurement results (normative)

TBD

F.3 Test Tolerance and Derivation of Test Requirements (informative)

TBD

F.3.1 Measurement of test environments

TBD

F.3.2 Measurement of transmitter

Table F.3.2-1: Derivation of Test Requirements (Transmitter tests)

Sub clause	Test Tolerance (TT)	Formula for test requirement
6.2B.1.1 UE Maximum Output Power for Intra-Band Contiguous EN-DC	Same as 6.2.1 in TS 38.521-1	
6.2B.1.2 UE Maximum Output Power for Intra-Band Non-Contiguous EN-DC	Same as 6.2.1 in TS 38.521-1	
6.2B.1.3 UE Maximum Output Power for Inter-Band EN-DC within FR1	Same as 6.2.1 in TS 38.521-1 f_{NR} ≤ 3.0GHz 0.7 dB, BW_{NR} ≤ 40MHz 1.0 dB, 40MHz < BW_{NR} ≤ 100MHz 3.0GHz < f_{NR} ≤ 6.0GHz 1.0 dB, BW_{NR} ≤ 100MHz	
6.2B.1.4 UE Maximum Output Power for Inter-Band EN-DC including FR2	Same as 6.2.1 in TS 38.521-2	
6.2B.2.1 UE Maximum Output Power reduction for Intra-Band Contiguous EN-DC	Same as 6.2.2 in TS 38.521-1	
6.2B.2.2 UE Maximum Output Power reduction for Intra-Band Non-Contiguous EN-DC	Same as 6.2.2 in TS 38.521-1	
6.2B.2.3 UE Maximum Output Power reduction for Inter-Band EN-DC within FR1	Same as 6.2.2 in TS 38.521-1 f_{NR} ≤ 3.0GHz 0.7 dB, BW_{NR} ≤ 40MHz 1.0 dB, 40MHz < BW_{NR} ≤ 100MHz 3.0GHz < f_{NR} ≤ 6.0GHz 1.0 dB, BW_{NR} ≤ 100MHz	
6.2B.3.1 UE Additional Maximum Output Power reduction for Intra-band contiguous EN-DC	Same as 6.2.3 in TS 38.521-1	
6.2B.3.2 UE Additional Maximum Output Power reduction for Intra-Band Non-Contiguous EN-DC	Same as 6.2.3 in TS 38.521-1	
6.2B.3.3 UE Additional Maximum Output Power reduction for Inter-Band EN-DC within FR1	Same as 6.2.3 in TS 38.521-1 f_{NR} ≤ 3.0GHz 0.7 dB, BW_{NR} ≤ 40MHz 1.0 dB, 40MHz < BW_{NR} ≤ 100MHz 3.0GHz < f_{NR} ≤ 6.0GHz 1.0 dB, BW_{NR} ≤ 100MHz	
6.2B.4.1.1 Configured Output Power Level for Intra-Band Contiguous EN-DC	Same as 6.2.4 in TS 38.521-1	
6.2B.4.1.2 Configured Output Power for Intra-Band Non-Contiguous EN-DC	Same as 6.2.4 in TS 38.521-1	
6.2B.4.1.3 Configured Output Power for Inter-Band EN-DC within FR1	Same as 6.2.4 in TS 38.521-1 f_{NR} ≤ 3.0GHz 0.7 dB, BW_{NR} ≤ 40MHz 1.0 dB, 40MHz < BW_{NR} ≤ 100MHz 3.0GHz < f_{NR} ≤ 6.0GHz 1.0 dB, BW_{NR} ≤ 100MHz	
6.3B.1.1 Minimum Output Power for intra-band contiguous EN-DC	Same as 6.3.1 in TS 38.521-1	

6.3B.1.2 Minimum output power for intra-band non-contiguous EN-DC	Same as 6.3.1 in TS 38.521-1	
6.3B.1.3 Minimum output power for inter-band EN-DC within FR1	Same as 6.3.1 in TS 38.521-1	
6.3B.1.4 Minimum Output Power for EN-DC Interband including FR2	Same as 6.3.1 in TS 38.521-2	
6.3B.2.1 Transmit OFF Power for intra-band contiguous EN-DC	Same as 6.3.2 in TS 38.521-1	
6.3B.2.2 Transmit OFF Power for intra-band non-contiguous EN-DC	Same as 6.3.2 in TS 38.521-1	
6.3B.2.3 Transmit OFF Power for inter-band EN-DC within FR1	Same as 6.3.2 in TS 38.521-1	
6.3B.3.1 Transmit OFF Power for intra-band contiguous EN-DC	Same as 6.3.3 in TS 38.521-1	
6.3B.3.2 Transmit OFF Power for intra-band non-contiguous EN-DC	Same as 6.3.3 in TS 38.521-1	
6.3B.3.3 Transmit OFF Power for inter-band EN-DC within FR1	Same as 6.3.3 in TS 38.521-1	
6.4B.1.1 Frequency Error for intra-band contiguous EN-DC	Same as 6.4.1 in TS 38.521-1	
6.4B.1.2 Frequency Error for intra-band non-contiguous EN-DC	Same as 6.4.1 in TS 38.521-1	
6.4B.1.3 Frequency Error for inter-band EN-DC within FR1	Same as 6.4.1 in TS 38.521-1	
6.4B.1.5 Frequency Error for inter-band EN-DC including FR2	Same as 6.4.1 in TS 38.521-2	
6.4B.2.1.1 Error Vector Magnitude for intra-band contiguous EN-DC	Same as 6.4.2.1 in TS 38.521-1	
6.4B.2.1.2 Carrier Leakage for intra-band contiguous EN-DC	Same as 6.4.2.2 in TS 38.521-1	
6.4B.2.1.3 In-band Emissions for intra-band contiguous EN-DC	Same as 6.4.2.3 in TS 38.521-1	
6.4B.2.1.4 EVM Equalizer Flatness for intra-band contiguous EN-DC	Same as 6.4.2.4 in TS 38.521-1	
6.4B.2.2.1 Error Vector Magnitude for intra-band non-contiguous EN-DC	Same as 6.4.2.1 in TS 38.521-1	
6.4B.2.2.2 Carrier Leakage for intra-band non-contiguous EN-DC	Same as 6.4.2.2 in TS 38.521-1	
6.4B.2.2.3 In-band Emissions for intra-band non-contiguous EN-DC	Same as 6.4.2.3 in TS 38.521-1	
6.4B.2.2.4 EVM Equalizer Flatness for intra-band non-contiguous EN-DC	Same as 6.4.2.4 in TS 38.521-1	
6.4B.2.3.1 Error Vector Magnitude for inter-band EN-DC within FR1	Same as 6.4.2.1 in TS 38.521-1	
6.4B.2.3.2 Carrier Leakage for inter-band EN-DC within FR1	Same as 6.4.2.2 in TS 38.521-1	

6.4B.2.3.3 In-band Emissions for inter-band EN-DC within FR1	Same as 6.4.2.3 in TS 38.521-1	
6.4B.2.3.4 EVM Equalizer Flatness for inter-band EN-DC within FR1	Same as 6.4.2.4 in TS 38.521-1	
6.4B.2.4.1 Error Vector Magnitude for inter-band EN-DC including FR2	Same as 6.4.2.1 in TS 38.521-2	
6.4B.2.4.2 Carrier Leakage for inter-band EN-DC including FR2	Same as 6.4.2.2 in TS 38.521-2	
6.4B.2.4.3 In-band Emissions for inter-band EN-DC including FR2	Same as 6.4.2.3 in TS 38.521-2	
6.4B.2.4.4 EVM Equalizer Flatnessfor inter-band EN-DC including FR2	Same as 6.4.2.4 in TS 38.521-2	
6.5B.1.1 Occupied bandwidth for Intra-Band Contiguous EN-DC	Same as 6.5.1 in TS 38.521-1	
6.5B.1.2 Occupied bandwidth for Intra-Band Non-Contiguous EN-DC	Same as 6.5.1 in TS 38.521-1	
6.5B.1.3 Occupied bandwidth for Inter-Band EN-DC within FR1	Same as 6.5.1 in TS 38.521-1	
6.5B.1.4 Occupied bandwidth for Inter-Band EN-DC including FR2	Same as 6.5.1 in TS 38.521-2	
6.5B.2.1.1 Spectrum emissions mask for intra-band contiguous EN-DC	Same as 6.5.2.2 in TS 38.521-1	
6.5B.2.1.2 Additional spectrum emissions mask for intra-band contiguous EN-DC	Same as 6.5.2.3 in TS 38.521-1	
6.5B.2.1.3 Adjacent channel leakage ratio for intra-band contiguous EN-DC	Same as 6.5.2.4.1 in TS 38.521-1	
6.5B.2.2.1 Spectrum emissions mask for intra-band non-contiguous EN-DC	Same as 6.5.2.2 in TS 38.521-1	
6.5B.2.2.2 Additional Spectrum emissions mask for intra-band non-contiguous EN-DC	Same as 6.5.2.3 in TS 38.521-1	
6.5B.2.2.3 Adjacent channel leakage ratio for intra-band non-contiguous EN-DC	Same as 6.5.2.4.1 in TS 38.521-1	
6.5B.2.3.1 Spectrum emissions mask for Inter-band EN-DC within FR1	Same as 6.5.2.2 in TS 38.521-1	
6.5B.2.3.2 Additional Spectrum emissions mask for Inter-band EN-DC within FR1	Same as 6.5.2.3 in TS 38.521-1	
6.5B.2.3.3 Adjacent channel leakage ratio for inter-band EN-DC within FR1	Same as 6.5.2.4.1 in TS 38.521-1	
6.5B.2.4.1 Spectrum emissions mask for Inter-band EN-DC including FR2	Same as 6.5.2.1 in TS 38.521-2	
6.5B.2.4.3 Adjacent channel leakage ratio for Inter-band EN-DC including FR2	Same as 6.5.2.3 in TS 38.521-2	
6.5B.3.1.1 General spurious emissions for intra-band contiguous EN-DC	Same as 6.5.3.1 in TS 38.521-1	

6.5B.3.1.2 Spurious emission band UE co-existence for intra-band contiguous EN-DC	Same as 6.5.3.2 in TS 38.521-1	
6.5B.3.2.1 General spurious emissions for Intra-band non-contiguous EN-DC	Same as 6.5.3.1 in TS 38.521-1	
6.5B.3.2.2 Spurious Emission band UE co-existence for intra-band non-contiguous EN-DC	Same as 6.5.3.2 in TS 38.521-1	
6.5B.3.3.1 General spurious emissions for Inter-band EN-DC within FR1	Same as 6.5.3.1 in TS 38.521-1	
6.5B.3.3.2 Spurious emission band UE co-existence for Inter-band within FR1	Same as 6.5.3.2 in TS 38.521-1	
6.5B.3.4.2 Spurious emission band UE co-existence for Inter-band including FR2	Same as 6.5.3.2 in TS 38.521-2	
6.5B.5.3 Transmit intermodulation for Inter-band EN-DC within FR1	Same as 6.5.4 in TS 38.521-1	

F.3.3 Measurement of receiver

Table F.3.3-1: Derivation of Test Requirements (Receiver tests)

Sub clause	Test Tolerance (TT)	Formula for test requirement
7.3B.2.1 Reference sensitivity for Intra-band Contiguous EN-DC	Same as 7.3.2 in TS 38.521-1	
7.3B.2.2 Reference sensitivity for Intra-band non-contiguous EN-DC	Same as 7.3.2 in TS 38.521-1	
7.3B.2.3 Reference sensitivity for Inter-band EN-DC within FR1	Same as 7.3.2 in TS 38.521-1	
7.4B.1 Maximum Input Level for Intra-Band Contiguous EN-DC	Same as 7.4 in TS 38.521-1	
7.4B.2 Maximum Input Level for Intra-Band Non-Contiguous EN-DC	Same as 7.4 in TS 38.521-1	
7.4B.3 Maximum Input Level for Inter-band EN-DC within FR1	Same as 7.4 in TS 38.521-1	
7.5B.1 Adjacent Channel Selectivity for intra-band contiguous EN-DC	Same as 7.5 in TS 38.521-1	
7.5B.2 Adjacent Channel Selectivity for intra-band non-contiguous EN-DC	Same as 7.5 in TS 38.521-1	
7.5B.3 Adjacent Channel Selectivity for inter-band EN-DC within FR1	Same as 7.5 in TS 38.521-1	
7.6B.2.1 Inband blocking for intra-band contiguous EN-DC in FR1	Same as 7.6.2 in TS 38.521-1	
7.6B.2.2 Inband blocking for intra-band non-contiguous EN-DC in FR1	Same as 7.6.2 in TS 38.521-1	
7.6B.2.3 Inband blocking for inter-band EN-DC within FR1	Same as 7.6.2 in TS 38.521-1	
7.6B.3.1 Out-of-band blocking for intra-band contiguous EN-DC in FR1	Same as 7.6.3 in TS 38.521-1	
7.6B.3.2 Out-of-band blocking for intra-band non-contiguous EN-DC in FR1	Same as 7.6.3 in TS 38.521-1	
7.6B.3.3 Out-of-band blocking for inter-band EN-DC within FR1	Same as 7.6.3 in TS 38.521-1	
7.6B.4.1 Narrow band blocking for intra-band contiguous EN-DC in FR1	Same as 7.6.4 in TS 38.521-1	
7.6B.4.2 Narrow band blocking for intra-band non-contiguous EN-DC in FR1	Same as 7.6.4 in TS 38.521-1	
7.6B.4.3 Narrow band blocking for inter-band EN-DC within FR1	Same as 7.6.4 in TS 38.521-1	
7.7B.1 Spurious Response for intra-band contiguous EN-DC in FR1	Same as 7.7 in TS 38.521-1	
7.7B.2 Spurious Response for intra-band non-contiguous EN-DC in FR1	Same as 7.7 in TS 38.521-1	
7.7B.3 Spurious Response for inter-band EN-DC within FR1	Same as 7.7 in TS 38.521-1	
7.8B.2.1 Wideband Intermodulation for intra-band contiguous EN-DC in FR1	Same as 7.8.2 in TS 38.521-1	

7.8B.2.2 Wideband Intermodulation for intra-band non-contiguous EN-DC in FR1	Same as 7.8.2 in TS 38.521-1	
7.8B.2.3 Wideband Intermodulation for inter-band EN-DC within FR1	Same as 7.8.2 in TS 38.521-1	
7.9B.1 Spurious Emissions for intra-band contiguous EN-DC within FR1	Same as 7.9 in TS 38.521-1	
7.9B.2 Spurious Emissions for intra-band non-contiguous EN-DC within FR1	Same as 7.9 in TS 38.521-1	
7.9B.3 Spurious Emissions for inter-band EN-DC within FR1	Same as 7.9 in TS 38.521-1	

Annex G (normative): Uplink Physical Channels

Please refer to Annex G in TS 38.521-1 [8] and 38.521-2 [9] for appropriate details as needed for test cases in this test specification. EN-DC exceptions will be added.

Annex H (normative): Statistical Testing

Editor's Note:

- Further investigate the technical details behind this statistical method to ensure that this is applicable for FR2 radiated test cases.

H.1 General

FFS.

H.2 Statistical testing of receiver characteristics

H.2.1 General

The test of receiver characteristics is twofold.

1. A signal or a combination of signals is offered to the RX port(s) of the receiver.
2. The ability of the receiver to demodulate /decode this signal is verified by measuring the throughput.

In (2) is the statistical aspect of the test and is treated here.

The minimum requirement for all receiver tests is >95% of the maximum throughput.

All receiver tests are performed in static propagation conditions. No fading conditions are applied.

H.2.2 Mapping throughput to error ratio

a) The measured information bit throughput R is defined as the sum (in kilobits) of the information bit payloads successfully received during the test interval, divided by the duration of the test interval (in seconds).

b) In measurement practice the UE indicates successfully received information bit payload by signalling an ACK to the SS.
If payload is received, but damaged and cannot be decoded, the UE signals a NACK.

c) Only the ACK and NACK signals, not the data bits received, are accessible to the SS.
The number of bits is known in the SS from knowledge of what payload was sent.

d) For the reference measurement channel, applied for testing, the number of bits is different in different subframes, however in a radio frame it is fixed during one test.

e) The time in the measurement interval is composed of successfully received subframes (ACK), unsuccessfully received subframes (NACK) and no reception at all (DTX-subframes).

f) DTX-subframes may occur regularly according the applicable reference measurement channel (regDTX).
In real live networks this is the time when other UEs are served. In TDD these are the UL and special subframes.
regDTX vary from test to test but are fixed within the test.

g) Additional DTX-subframes occur statistically when the UE is not responding ACK or NACK where it should. (statDTX)
This may happen when the UE was not expecting data or decided that the data were not intended for it.

The pass / fail decision is done by observing the:

- number of NACKs
- number of ACKs and
- number of statDTXs (regDTX is implicitly known to the SS)

The ratio `(NACK + statDTX)/(NACK+ statDTX + ACK)`is the Error Ratio (ER). Taking into account the time consumed by the ACK, NACK, and DTX-TTIs (regular and statistical), ER can be mapped unambiguously to throughput for any single reference measurement channel test.

H.2.3 Design of the test

The test is defined by the following design principles (see clause H.x, Theory….):

1. The early decision concept is applied.
2. A second limit is introduced: Bad DUT factor M>1
3. To decide the test pass:

   Supplier risk is applied based on the Bad DUT quality

   To decide the test fail

   Customer Risk is applied based on the specified DUT quality

The test is defined by the following parameters:

1. Limit ER = 0.05 (Throughput limit = 95%)
2. Bad DUT factor M=1.5 (selectivity)
3. Confidence level CL = 95% (for specified DUT and Bad DUT-quality)

H.2.4 Numerical definition of the pass fail limits

Table H.2.4-1: pass fail limits

ne	ns_p	ns_f	ne	ns_p	ns_f	ne	ns_p	ns_f	ne	ns_p	ns_f
0	67	NA	39	763	500	78	1366	1148	117	1951	1828
1	95	NA	40	778	516	79	1381	1166	118	1965	1845
2	119	NA	41	794	532	80	1396	1183	119	1980	1863
3	141	NA	42	810	548	81	1412	1200	120	1995	1881
4	162	NA	43	826	564	82	1427	1217	121	2010	1899
5	183	NA	44	842	580	83	1442	1234	122	2025	1916
6	202	NA	45	858	596	84	1457	1252	123	2039	1934
7	222	NA	46	873	612	85	1472	1269	124	2054	1952
8	241	NA	47	889	629	86	1487	1286	125	2069	1969
9	259	NA	48	905	645	87	1502	1303	126	2084	1987
10	278	76	49	920	661	88	1517	1321	127	2099	2005
11	296	88	50	936	678	89	1532	1338	128	2113	2023
12	314	100	51	952	694	90	1547	1355	129	2128	2040
13	332	113	52	967	711	91	1562	1373	130	2143	2058
14	349	126	53	983	727	92	1577	1390	131	2158	2076
15	367	140	54	998	744	93	1592	1407	132	2172	2094
16	384	153	55	1014	760	94	1607	1425	133	2187	2111
17	401	167	56	1029	777	95	1623	1442	134	2202	2129
18	418	181	57	1045	793	96	1637	1459	135	2217	2147
19	435	195	58	1060	810	97	1652	1477	136	2231	2165
20	452	209	59	1076	827	98	1667	1494	137	2246	2183
21	469	224	60	1091	844	99	1682	1512	138	2261	2201
22	486	238	61	1106	860	100	1697	1529	139	2275	2218
23	503	253	62	1122	877	101	1712	1547	140	2290	2236
24	519	268	63	1137	894	102	1727	1564	141	2305	2254
25	536	283	64	1153	911	103	1742	1582	142	2320	2272
26	552	298	65	1168	928	104	1757	1599	143	2334	2290
27	569	313	66	1183	944	105	1772	1617	144	2349	2308
28	585	328	67	1199	961	106	1787	1634	145	2364	2326
29	602	343	68	1214	978	107	1802	1652	146	2378	2344
30	618	359	69	1229	995	108	1817	1669	147	2393	2361
31	634	374	70	1244	1012	109	1832	1687	148	2408	2379
32	650	389	71	1260	1029	110	1847	1704	149	2422	2397
33	667	405	72	1275	1046	111	1861	1722	150	2437	2415
34	683	421	73	1290	1063	112	1876	1740	151	2452	2433
35	699	436	74	1305	1080	113	1891	1757	152	2466	2451
36	715	452	75	1321	1097	114	1906	1775	153*)	NA	2469
37	731	468	76	1336	1114	115	1921	1793			
38	747	484	77	1351	1131	116	1936	1810	*) note 2 in H.2.5		

NOTE 1: The first column is the number of errors (ne = number of NACK + statDTX)

NOTE 2: The second column is the number of samples for the pass limit (ns_p, ns=Number of Samples= number of `NACK + statDTX + ACK`)

NOTE 3: The third column is the number of samples for the fail limit (ns_f)

H.2.5 Pass fail decision rules

The pass fail decision rules apply for a single test, comprising one component in the test vector. The over all Pass /Fail conditions are defined in clause H.2.6and H.2A.6

Having observed 0 errors, pass the test at 67+ samples, otherwise continue

Having observed 1 error, pass the test at 95+ otherwise continue

Having observed 2 errors, pass the test at 119+ samples, fail the test at 2- samples, otherwise continue

Etc. etc.

Having observed 151 errors, pass the test at 2452+ samples, fail the test at 2433- samples, otherwise continue

Having observed 152 errors, pass the test at 2466+ samples, fail the test at 2451- samples.

Where x+ means: x or more, x- means x or less

NOTE 1: an ideal DUT passes after 67 samples. The maximum test time is 2466 samples.

NOTE 2: It is allowed to deviate from the early decision concept by postponing the decision (pass/fail or continue). Postponing the decision to or beyond the end of Table H.2.4-1 requires a pass fail decision against the test limit: pass the DUT for ER<0.0618, otherwise fail.

Annex I (normative): Coarse grid and offset value for spurious emission tests

Please refer to Annex I in TS 38.521-1 [8] and 38.521-2 [9] for appropriate details as needed for test cases in this test specification. Exceptions for EN-DC may be added as needed.

Annex J (normative): Test applicability per permitted test method

Please refer to Annex J in TS 38.521-1 [8] and 38.521-2 [9] for appropriate details as needed for test cases in this test specification. Exceptions for EN-DC may be added as needed.

Annex K (normative): EIRP Measurement Procedures

Please refer to Annex K in TS 38.521-1 [8] and 38.521-2 [9] for appropriate details as needed for test cases in this test specification. Exceptions for EN-DC may be added as needed.

Annex L (normative): TRP Measurement Procedures

Please refer to Annex L in TS 38.521-1 [8] and 38.521-2 [9] for appropriate details as needed for test cases in this test specification. Exceptions for EN-DC may be added as needed.

Annex M (normative): Dual uplink interferer

UE is mandated to support operation in dual uplink mode also in EN-DC configuration for FR1 listed in Table 7.3.2.1.5-1 and indicated by column single uplink allowed if the intermodulation products caused by the dual uplink operation do not interfere own primary downlink transmission channel bandwidth. For intermodulation products falling into LTE 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 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: fIBW = |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): [fIBW – IBW/2, fIBW + 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 N (informative): Change history

Change history							
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
2017-08	RAN5#76	R5-174710	-	-	-	Draft skeleton	0.0.1
2018-01	RAN5#1-5G-NR Adhoc	R5-180086	-	-	-	TP to add clause 6.2B.3.3 UE A-MPR intra-band EN-DC to 38.521-3	0.1.0
2018-01	RAN5#1-5G-NR Adhoc	R5-180087	-	-	-	TP to add clause 6.5B.2.1.2 Additional Spectrum emissions mask (contiguous sub-blocks) for intra-band EN-DC to 38.521-3	0.1.0
2018-02	RAN5#78	R5-181509	-	-	-	Updated 38.521-3 for new Annex A Dual uplink interferer information	0.2.0
2018-02	RAN5#78	R5-181690	-	-	-	Updated 38.521-3 for channel bandwidth information	0.2.0
2018-03	RAN5#2-5G-NR Adhoc	R5-181760	-	-	-	Draft TS 38.521-3 0.3.0	0.3.0
2018-04	RAN5#2-5G-NR Adhoc	R5-182035	-	-	-	5G-NR Text Proposal to add spurious emissions test case to 38.521-3	0.4.0
2018-04	RAN5#2-5G-NR Adhoc	R5-182016	-	-	-	TP for new test case: 6.5B.2.1.3, Adjacent channel leakage ratio for intra-band contiguous EN-DC	0.4.0
2018-04	RAN5#2-5G-NR Adhoc	R5-182017	-	-	-	TP to update clause 6.2B.3.1 UE A-MPR intra-band EN-DC to 38.521-3	0.4.0
2018-04	RAN5#2-5G-NR Adhoc	R5-182018	-	-	-	TP to update clause 6.5B.2.1.2 Additional spectrum emission mask to 38.521-3	0.4.0
2018-04	RAN5#2-5G-NR Adhoc	R5-181807	-	-	-	Update to Operating bands of 38.521-3	0.4.0
2018-04	RAN5#2-5G-NR Adhoc	R5-181808	-	-	-	Update to section 3 and section 4 of 38.521-3	0.4.0
2018-04	RAN5#2-5G-NR Adhoc	R5-181828	-	-	-	Updated 38.521-3 for channel bandwidth information with new structure	0.4.0
2018-07	RAN5#79	R5-183961	-	-	-	5G_FR1_EN_DC_RF_sensitivity_for_DC	0.5.0
2018-07	RAN5#79	R5-183962	-	-	-	Introduction of TC 6.2B.1.3 for EN-DC	0.5.0
2018-07	RAN5#79	R5-183949	-	-	-	Statistical Testing Annex for 38.521-3	0.5.0
2018-07	RAN5#79	R5-182995	-	-	-	Corrections annex for EIRP and TRP metric definition in TS 38.521-3	0.5.0
2018-07	RAN5#79	R5-183707	-	-	-	TP for updating test case 6.2B.2.1, UE Maximum Output Power reduction for Intra-Band Contiguous EN-DC	0.5.0
2018-07	RAN5#79	R5-183708	-	-	-	Updated clause 5.5B Configuration for DC to 38.521-3	0.5.0
2018-07	RAN5#79	R5-183709	-	-	-	TP to add Occupied BW EN-DC test case	0.5.0
2018-07	RAN5#79	R5-183710	-	-	-	TP to add SEM EN-DC test case	0.5.0
2018-07	RAN5#79	R5-183711	-	-	-	TP to add ACLR EN-DC test case	0.5.0
2018-09	RAN5#80	R5-185563	-	-	-	FR2_StoreTxRxBeamPeakCoordinates_38.521-3	1.0.0
2018-09	RAN5#80	R5-185520	-	-	-	Addition of TRx MU and TT in TS 38.521-3 Annex	1.0.0
2018-09	RAN5#80	R5-185503	-	-	-	Add Clause 7.5B.1 into TS 38.521-3	1.0.0
2018-09	RAN5#80	R5-185504	-	-	-	Add Clause 7.5B.2 into TS 38.521-3	1.0.0
2018-09	RAN5#80	R5-185505	-	-	-	Add Clause 7.5B.3 into TS 38.521-3	1.0.0
2018-09	RAN5#80	R5-184579	-	-	-	Updated EN-DC configuration information in clause 5	1.0.0
2018-09	RAN5#80	R5-184580	-	-	-	TIB value add for EN-DC band in 38.521-3	1.0.0
2018-09	RAN5#80	R5-184671	-	-	-	Update of References in Section 2 of 38.521-3 spec	1.0.0
2018-09	RAN5#80	R5-184672	-	-	-	Updates to Operating Bands in Section 5.2	1.0.0
2018-09	RAN5#80	R5-184737	-	-	-	Dual uplink interferer updated to 38.521-3	1.0.0
2018-09	RAN5#80	R5-184737	-	-	-	Dual uplink interferer updated to 38.521-3	1.0.0
2018-09	RAN5#80	R5-185332	-	-	-	Addition of 6.2B.4.1.1 Configured OP for Intra-Band Contiguous EN-DC	1.0.0
2018-09	RAN5#80	R5-185333	-	-	-	Addition of 6.2B.4.1.2 Configured OP for Intra-Band Non-Contiguous EN-DC	1.0.0
2018-09	RAN5#80	R5-185507	-	-	-	Addition of 6.2B.4.1.3 Configured OP for Inter-Band within FR1	1.0.0
2018-09	RAN5#80	R5-185198	-	-	-	Addition of 6.2B.4.1.4 Configured OP for Inter-Band EN-DC including FR2	1.0.0
2018-09	RAN5#80	R5-185199	-	-	-	Addition of 6.2B.4.1.5 Configured OP for Inter-Band EN-DC including both FR1 and FR2	1.0.0
2018-09	RAN5#80	R5-185469	-	-	-	TP for updating test case 6.2B.3.1 UE AMPR for Intra-band contiguous EN-DC	1.0.0
2018-09	RAN5#80	R5-185470	-	-	-	TP for updating test case 6.2B.3.2 UE AMPR for Intra-band non-contiguous EN-DC	1.0.0
2018-09	RAN5#80	R5-185200	-	-	-	TP for updating test case 6.5B.2.1.2 Additional spectrum emission mask for intra-band contiguous EN-DC	1.0.0

2018-09	RAN5#80	R5-185556	-	-	-	FR2_UE_BeamlockInvoke_38.521-3	1.0.0
2018-09	RAN5#80	R5-185472	-	-	-	Update of TC 6.2B.1.1	1.0.0
2018-09	RAN5#80	R5-185473	-	-	-	Introduction of TC 6.2B.1.2	1.0.0
2018-09	RAN5#80	R5-185474	-	-	-	Update of 6.2B.1.3	1.0.0
2018-09	RAN5#80	R5-185201	-	-	-	Introduction of TC 7.4B.1	1.0.0
2018-09	RAN5#80	R5-185202	-	-	-	Introduction of 7.4B.2	1.0.0
2018-09	RAN5#80	R5-185203	-	-	-	Introduction of 7.4B.3	1.0.0
2018-09	RAN5#80	R5-185479	-	-	-	Update Occupied Bandwidth for interband EN-DC within FR1	1.0.0
2018-09	RAN5#80	R5-185480	-	-	-	Update SEM interband EN-DC within FR1	1.0.0
2018-09	RAN5#80	R5-185481	-	-	-	Update ACLR for interband EN-DC within FR1	1.0.0
2018-09	RAN5#80	R5-185204	-	-	-	5G NR_EN_DC with FR1_Text update for RX sensitivity	1.0.0
2018-09	RAN5#80	R5-185205	-	-	-	5G NR_EN_DC with FR1_Text_proposal for_TX_Spurious_emission	1.0.0
2018-09	RAN5#80	R5-185422	-	-	-	Alignment of Annex numbering with core spec	1.0.0
2018-09	RAN5#80	R5-184897	-	-	-	Updates to Channel Arrangement section in 38.521-3	1.0.0
2018-09	RAN5#80	R5-185206	-	-	-	Addition of TC6.3B.1.1 Minimum Output power for intra-band contiguous EN-DC	1.0.0
2018-09	RAN5#80	R5-185207	-	-	-	Addition of TC6.3B.1.2 Minimum output power for intra-band non-contiguous EN-DC	1.0.0
2018-09	RAN5#80	R5-185208	-	-	-	Addition of TC6.3B.1.3 Minimum output power for inter-band EN-DC within FR1	1.0.0
2018-09	RAN5#80	R5-185351	-	-	-	Update across EN-DC RF test cases in TS 38.521-3	1.0.0
2018-09	RAN#81	-	-	-	-	raised to v15.0.0 with editorial changes only	15.0.0
2018-12	RAN#82	R5-186503	0033	-	F	FR2 Spurious Emission test case updates	15.1.0
2018-12	RAN#82	R5-186506	0034	-	F	Update Text on Store Beam Peak Coordinate	15.1.0
2018-12	RAN#82	R5-186507	0035	-	F	38.521-3 Applicability Rules	15.1.0
2018-12	RAN#82	R5-186601	0039	-	F	5G NR_EN_DC with FR1_Text update for Intra-Band Contiguous RX sensitivity	15.1.0
2018-12	RAN#82	R5-186602	0040	-	F	5G NR_Text update for TX spurious emission intra-band contiguous EN-DC	15.1.0
2018-12	RAN#82	R5-186608	0042	-	F	Spurious emission band UE co-existence for Inter-band EN-DC within FR1	15.1.0
2018-12	RAN#82	R5-186672	0044	-	F	Updating test case 6.2B.3.1 Additional Maximum Output Power reduction for Intra-band contiguous EN-DC	15.1.0
2018-12	RAN#82	R5-186673	0045	-	F	Updating test case 6.5B.2.1.2 Additional spectrum emissions mask for intra-band contiguous EN-DC	15.1.0
2018-12	RAN#82	R5-186681	0046	-	F	Updates to EN-DC test case 6.2B.2.1, UE Maximum Output Power reduction for Intra-Band Contiguous EN-DC	15.1.0
2018-12	RAN#82	R5-186684	0047	-	F	Updates to test case 6.2B.2.3, UE Maximum Output Power reduction for Inter-Band EN-DC within FR1	15.1.0
2018-12	RAN#82	R5-186788	0049	-	F	Minor update OBW, SEM and ACLR inter-band FR1 test cases	15.1.0
2018-12	RAN#82	R5-187153	0061	-	F	Updated EN-DC configuration information in clause 5	15.1.0
2018-12	RAN#82	R5-187371	0076	-	F	Addition of TC6.3B.2.1 Transmit OFF Power for intra-band contiguous EN-DC	15.1.0
2018-12	RAN#82	R5-187372	0077	-	F	Addition of TC6.3B.2.3 Transmit OFF Power for inter-band EN-DC within FR1	15.1.0
2018-12	RAN#82	R5-187373	0078	-	F	Addition of TC6.3B.2.2 Transmit OFF Power for intra-band non-contiguous EN-DC	15.1.0
2018-12	RAN#82	R5-187552	0083	-	F	Updates to TS 38.521-3 common sections 1-4 to align with core spec	15.1.0
2018-12	RAN#82	R5-187559	0084	-	F	Updates to TS 38.521-3 Section 5 to align with core spec	15.1.0
2018-12	RAN#82	R5-187562	0085	-	F	Update to TC6.5B.3.2.1 - General Spurious Emissions for intra-band non-contiguous EN-DC	15.1.0
2018-12	RAN#82	R5-187563	0086	-	F	Update to 7.3B.2.2 - REFSENS for Intra-band Non-Contiguous EN-DC	15.1.0
2018-12	RAN#82	R5-187565	0087	-	F	Updates to TS 38.521-3 Section 4 with LTE anchor details	15.1.0
2018-12	RAN#82	R5-187614	0094	-	F	Updates to EN-DC test case 6.2B.2.2, UE Maximum Output Power reduction for Intra-Band Non-Contiguous EN-DC	15.1.0
2018-12	RAN#82	R5-187816	0048	1	F	Adding test case 6.2B.2.4, UE Maximum Output Power reduction for Inter-Band EN-DC including FR2	15.1.0
2018-12	RAN#82	R5-187819	0053	1	F	Update general parameter Connection without release in initial conditions in TS 38.521-3	15.1.0
2018-12	RAN#82	R5-187820	0043	1	F	Updates to test case 6.5B.2.1.3, Adjacent channel leakage ratio for intra-band contiguous EN-DC	15.1.0
2018-12	RAN#82	R5-187821	0052	1	F	Addition OBW intraband non contiguous EN-DC	15.1.0
2018-12	RAN#82	R5-187822	0055	1	F	Introduction of New test case 6.4B.2.2.1 Error Vector Magnitude for intra-band non-contiguous EN-DC	15.1.0
2018-12	RAN#82	R5-187823	0056	1	F	Introduction of New test case 6.4B.2.2.2 Carrier Leakage for intra-band non-contiguous EN-DC	15.1.0
2018-12	RAN#82	R5-187825	0058	1	F	Introduction of New test case 6.4B.2.3.1 Error Vector Magnitude for inter-band EN-DC within FR1	15.1.0
2018-12	RAN#82	R5-187826	0059	1	F	Introduction of New test case 6.4B.2.3.2 Carrier Leakage for inter-band EN-DC within FR1	15.1.0

2018-12	RAN#82	R5-187827	0060	1	F	Introduction of New test case 6.4B.2.3.3 In-band Emissions for inter-band EN-DC within FR1	15.1.0
2018-12	RAN#82	R5-187828	0070	1	F	Introduction of Error Vector Magnitude for intra-band contiguous EN-DC	15.1.0
2018-12	RAN#82	R5-187829	0071	1	F	Introduction of Carrier Leakage for intra-band contiguous EN-DC	15.1.0
2018-12	RAN#82	R5-187831	0088	1	F	FR2 General Spurious Emission test case update	15.1.0
2018-12	RAN#82	R5-187832	0089	1	F	FR2 Reference Sensitivity test case update	15.1.0
2018-12	RAN#82	R5-187833	0092	1	F	Updates to clause 7.3B.3.4 in TS 38.521-3	15.1.0
2018-12	RAN#82	R5-187834	0090	1	F	Updates to sections 1-4 in TS 38.521-3 to align with core spec	15.1.0
2018-12	RAN#82	R5-187835	0091	1	F	Updates to Clause 5 in TS 38.521-3	15.1.0
2018-12	RAN#82	R5-187913	0067	1	F	Addition of notes to clarify test point selection into general section of TS 38.521-3	15.1.0
2018-12	RAN#82	R5-188012	0057	1	F	Introduction of New test case 6.4B.2.2.3 In-band Emissions for intra-band non-contiguous EN-DC	15.1.0
2018-12	RAN#82	R5-188013	0050	1	F	Addition OBW intra-band contiguous EN-DC	15.1.0
2018-12	RAN#82	R5-188014	0051	1	F	Addition SEM intra-band contiguous EN-DC	15.1.0
2018-12	RAN#82	R5-188015	0064	1	F	Additional Spurious Emissions for Intra-band contiguous EN-DC	15.1.0
2018-12	RAN#82	R5-188016	0065	1	F	Additional Spurious Emissions for Intra-band non-contiguous EN-DC	15.1.0
2018-12	RAN#82	R5-188017	0066	1	F	Additional Spurious emission for inter-band EN-DC	15.1.0
2018-12	RAN#82	R5-188018	0068	1	F	Spurious emission band UE co-existence for intra-band non-contiguous EN-DC	15.1.0
2018-12	RAN#82	R5-188019	0072	1	F	Introduction of In-band Emissions for intra-band contiguous EN-DC	15.1.0
2018-12	RAN#82	R5-188020	0073	1	F	Addition of TC6.3B.3.1 Tx ON/OFF time mask for intra-band contiguous EN-DC	15.1.0
2018-12	RAN#82	R5-188021	0074	1	F	Addition of TC6.3B.3.2 Tx ON/OFF time mask for intra-band non-contiguous EN-DC	15.1.0
2018-12	RAN#82	R5-188022	0075	1	F	Addition of TC6.3B.3.3 Tx ON/OFF time mask for inter-band EN-DC within FR1	15.1.0
2018-12	RAN#82	R5-188023	0080	1	F	Update of test case 6.5B.2.1.2 Additional spectrum emission mask for intra-band contiguous EN-DC for NS_04	15.1.0
2018-12	RAN#82	R5-188024	0081	1	F	Update of test case 6.2B.3.1 UE A-MPR for Intra-band contiguous EN-DC for NS_04	15.1.0
2018-12	RAN#82	R5-188025	0038	1	F	Update Clause 7.5B.3 in TS 38.521-3	15.1.0
2018-12	RAN#82	R5-188026	0041	1	F	5G NR_EN_DC with FR1_Text update for Inter-Band RX sensitivity	15.1.0
2018-12	RAN#82	R5-188027	0082	1	F	Update TC 7.4B.3	15.1.0
2018-12	RAN#82	R5-188028	0036	1	F	Updates of MU in TS 38.521-3 Annex F during RAN5#81	15.1.0
2018-12	RAN#82	R5-188029	0037	1	F	Updates of TT in TS 38.521-3 Annex F during RAN5#81	15.1.0
2018-12	RAN#82	R5-188039	0093	1	F	LTE Anchor Link configuration for FR2	15.1.0
2018-12	RAN#82	R5-188219	0062	1	F	Introduction of receiver spurious emission tests for FR1 inter-band EN-DC	15.1.0
2018-12	RAN#82	R5-188220	0063	1	F	Introduction of wideband intermodulation tests for FR1 inter-band EN-DC	15.1.0
2018-12	RAN#82	R5-188221	0054	1	F	LTE TDD configuration for UE Tx test in EN-DC	15.1.0
2018-12	RAN#82	R5-188222	0069	1	F	Core alignment CR to capture TS 38.101-3 updates during RAN4#89	15.1.0
2019-03	RAN#83	R5-191057	0165	-	F	Introduction of TC 7.5B.0	15.2.0
2019-03	RAN#83	R5-191157	0174	-	F	Updated EN-DC configuration information in clause 5	15.2.0
2019-03	RAN#83	R5-191231	0175	-	F	Adding missing reference to 38.521-3	15.2.0
2019-03	RAN#83	R5-191336	0176	-	F	Updates to EN-DC test case 6.2B.2.1, UE Maximum Output Power reduction for Intra-Band Contiguous EN-DC	15.2.0
2019-03	RAN#83	R5-191339	0177	-	F	Updates to EN-DC test case 6.2B.2.2, UE Maximum Output Power reduction for Intra-Band Non-Contiguous EN-DC	15.2.0
2019-03	RAN#83	R5-191340	0178	-	F	Adding test case 6.5A.2.3, Adjacent channel leakage ratio for CA without EN-DC	15.2.0
2019-03	RAN#83	R5-191510	0183	-	F	Shared Risk clarification in TS 38.521-3	15.2.0
2019-03	RAN#83	R5-191637	0193	-	F	Updates of TT in TS38.521-3 Annex F during RAN5#NR4	15.2.0
2019-03	RAN#83	R5-191845	0200	-	F	Text update for 7.3B.3 deltaRIB,c deltaRIBNC for EN-DC	15.2.0
2019-03	RAN#83	R5-191867	0205	-	F	Addition of 7.3B.2.0 Reference sensitivity Minimum Conformance Requirements for EN-DC	15.2.0
2019-03	RAN#83	R5-192004	0215	-	F	Update of TC 6.2B.1.1	15.2.0
2019-03	RAN#83	R5-192005	0216	-	F	Update of TC 6.2B.1.2	15.2.0

2019-03	RAN#83	R5-192006	0217	-	F	Update of TC 6.2B.1.3	15.2.0
2019-03	RAN#83	R5-192176	0224	-	F	TIB,c updated for CA and EN-DC cases	15.2.0
2019-03	RAN#83	R5-192177	0225	-	F	Updated to Annex M Dual uplink interferer	15.2.0
2019-03	RAN#83	R5-192206	0228	-	F	38.521-3 Common Section updates to clarify leverage across architecture options	15.2.0
2019-03	RAN#83	R5-192207	0229	-	F	Formatting updates and index correction in TS 38.521-3	15.2.0
2019-03	RAN#83	R5-192208	0230	-	F	38.521-1 Common Section updates to clarify leverage across architecture options	15.2.0
2019-03	RAN#83	R5-192209	0231	-	F	38.521-2 Common Section updates to clarify leverage across architecture options	15.2.0
2019-03	RAN#83	R5-192242	0237	-	F	Update of test case 6.2B.3.1 UE A-MPR for Intra-band contiguous EN-DC	15.2.0
2019-03	RAN#83	R5-192243	0238	-	F	Update of test case 6.2B.3.4 UE A-MPR for Inter-Band EN-DC including FR2	15.2.0
2019-03	RAN#83	R5-192244	0239	-	F	Update of test case 6.5B.2.1.2 UE Additional spectrum emissions mask for intra-band contiguous EN-DC	15.2.0
2019-03	RAN#83	R5-192423	0157	1	F	Update of TC 7.5B.1	15.2.0
2019-03	RAN#83	R5-192424	0159	1	F	Introduction of TC 7.5B.4	15.2.0
2019-03	RAN#83	R5-192425	0166	1	F	Update of TC 7.5B.3	15.2.0
2019-03	RAN#83	R5-192427	0180	1	F	Introduction of NSA FR1 7.6B.2.1 Inband blocking for intra-band contiguous EN-DC in FR1	15.2.0
2019-03	RAN#83	R5-192428	0182	1	F	Introduction of NSA FR1 7.6B.2.3 Inband blocking for inter-band EN-DC within FR1	15.2.0
2019-03	RAN#83	R5-192429	0184	1	F	Introduction of NSA FR1 7.6B.3.1 Out-of-band blocking for intra-band contiguous EN-DC in FR1	15.2.0
2019-03	RAN#83	R5-192430	0185	1	F	Introduction of NSA FR1 7.6B.3.2 Out-of-band blocking for intra-band non-contiguous EN-DC in FR1	15.2.0
2019-03	RAN#83	R5-192431	0186	1	F	Introduction of NSA FR1 7.6B.3.3 Out-of-band blocking for inter-band EN-DC within FR1	15.2.0
2019-03	RAN#83	R5-192432	0187	1	F	Introduction of NSA FR1 7.6B.4.1 Narrow band blocking for intra-band contiguous EN-DC in FR1	15.2.0
2019-03	RAN#83	R5-192433	0188	1	F	Introduction of NSA FR1 7.6B.4.2 Narrow band blocking for intra-band non-contiguous EN-DC in FR1	15.2.0
2019-03	RAN#83	R5-192434	0189	1	F	Introduction of NSA FR1 7.6B.4.3 Narrow band blocking for inter-band EN-DC within FR1	15.2.0
2019-03	RAN#83	R5-192435	0190	1	F	Introduction of NSA FR1 7.7B.1 Spurious Response for intra-band contiguous EN-DC in FR1	15.2.0
2019-03	RAN#83	R5-192436	0191	1	F	Introduction of NSA FR1 7.7B.2 Spurious Response for intra-band non-contiguous EN-DC in FR1	15.2.0
2019-03	RAN#83	R5-192437	0192	1	F	Introduction of NSA FR1 7.7B.3 Spurious Response for inter-band EN-DC within FR1	15.2.0
2019-03	RAN#83	R5-192438	0207	1	F	Text Update for 7.3B.2.2 Reference sensitivity for Intra-band non-contiguous EN-DC	15.2.0
2019-03	RAN#83	R5-192439	0234	1	F	TS 38.521-3 corrections and clean-up to TC categories within Clause 7	15.2.0
2019-03	RAN#83	R5-192440	0179	1	F	Editorial: Band combinations for Inter-band CA between FR1 and FR2	15.2.0

2019-03	RAN#83	R5-192441	0232	1	F	TS 38.521-3 Section 5 updates to align with core specification	15.2.0
2019-03	RAN#83	R5-192442	0195	1	F	Addition of TC6.3B.4.3 PRACH Time Mask for inter-band EN-DC within FR1	15.2.0
2019-03	RAN#83	R5-192443	0220	1	F	Update of EN-DC 6.2B.4.1.3 Configured transmitted power inter-band within FR1	15.2.0
2019-03	RAN#83	R5-192445	0233	1	F	TS 38.521-3 corrections and clean-up to TC categories within Clause 6	15.2.0
2019-03	RAN#83	R5-192453	0198	1	F	FR2 NSA Spurious Emission Coexistence test case	15.2.0
2019-03	RAN#83	R5-192454	0199	1	F	FR2 NSA Frequency Error test case	15.2.0
2019-03	RAN#83	R5-192455	0221	1	F	Addition of transmit modulation quality test cases for inter-band EN-DC including FR2	15.2.0
2019-03	RAN#83	R5-192456	0222	1	F	Introduction 6.5B.1.4 OBW interband EN-DC including FR2	15.2.0
2019-03	RAN#83	R5-192457	0223	1	F	Introduction 6.5B.2.4.1 SEM interband EN-DC including FR2	15.2.0
2019-03	RAN#83	R5-192458	0226	1	F	Introduction 6.5B.2.4.3 ACLR interband EN-DC including FR2	15.2.0
2019-03	RAN#83	R5-192459	0236	1	F	Addition of TC6.3B.1.4 - Minimum Output Power for EN-DC Interband including FR2	15.2.0
2019-03	RAN#83	R5-192535	0194	1	F	Clean up of occupied bandwidth for EN-DC within FR1	15.2.0
2019-03	RAN#83	R5-192600	0196	1	F	Addition of TC6.3B.4.1 PRACH Time Mask for intra-band contiguous EN-DC	15.2.0
2019-03	RAN#83	R5-192601	0197	1	F	Addition of TC6.3B.4.2 PRACH Time Mask for intra-band non-contiguous EN-DC	15.2.0
2019-03	RAN#83	R5-192603	0201	1	F	Text Update for 6.5B.3.2 Spurious Emissions for intra-band non-contiguous EN-DC	15.2.0
2019-03	RAN#83	R5-192604	0202	1	F	Text Update for 6.5B.3.1 Spurious Emissions for intra-band contiguous EN-DC	15.2.0
2019-03	RAN#83	R5-192605	0203	1	F	Text Update for 6.5B.3.3 Spurious Emissions for Inter-band EN-DC within FR1	15.2.0
2019-03	RAN#83	R5-192606	0204	1	F	Text Update for 6.5B.4 Additional Spurious Emissions for EN-DC	15.2.0
2019-03	RAN#83	R5-192607	0209	1	F	Update to Carrier Leakage for intra-band contiguous EN-DC	15.2.0
2019-03	RAN#83	R5-192608	0210	1	F	Introduction of Error Vector Magnitude for intra-band contiguous EN-DC	15.2.0
2019-03	RAN#83	R5-192609	0211	1	F	Update to In-band Emissions for intra-band contiguous EN-DC	15.2.0
2019-03	RAN#83	R5-192610	0227	1	F	Clarification on UL slots in OBW, SEM and ACLR in TS 38.521-3	15.2.0
2019-03	RAN#83	R5-192611	0158	1	F	Update of TC 7.5B.2	15.2.0
2019-03	RAN#83	R5-192617	0167	1	F	Introducing Wideband Intermodulation for intra-band EN-DC in FR1	15.2.0
2019-03	RAN#83	R5-192618	0168	1	F	Introducing receiver spurious emission for intra-band EN-DC in FR1	15.2.0
2019-03	RAN#83	R5-192619	0181	1	F	Introduction of NSA FR1 7.6B.2.2 Inband blocking for intra-band non-contiguous EN-DC in FR1	15.2.0
2019-03	RAN#83	R5-192620	0206	1	F	Text Update for 7.3B.2.1 Reference sensitivity for Intra-band Contiguous EN-DC	15.2.0
2019-03	RAN#83	R5-192622	0170	1	F	Updates of MU in TS38.521-3 Annex F during RAN5#82	15.2.0
2019-03	RAN#83	R5-192623	0171	1	F	Updates of TT in TS38.521-3 Annex F during RAN5#82	15.2.0
2019-03	RAN#83	R5-192626	0214	1	F	Update of TC 7.4B.2	15.2.0

2019-03	RAN#83	R5-192681	0235	1	F	Addition of TC6.2B.1.4 - Max Output Power for EN-DC Interband including FR2	15.2.0
2019-03	RAN#83	R5-192689	0218	1	F	Update of 6.2B.4.1.1 Configured output power Intra-band contiguous EN-DC	15.2.0
2019-03	RAN#83	R5-192690	0219	1	F	Update of EN-DC 6.2B.4.1.2 Configured transmitted power Intra-band non-contiguous	15.2.0
2019-03	RAN#83	R5-192844	0213	2	F	Update of TC 7.4B.1	15.2.0
2019-03	RAN#83	R5-192847	0212	1	F	Addition of 7.4B.0	15.2.0
2019-03	RAN#83	R5-192863	0172	1	F	Introduction of TxIM (inter-band EN-DC within FR1)	15.2.0
2019-03	RAN#83	-	-	-	-	Editorial correction of references to TS 38.508-1 clause 4.6 tables	15.2.0

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