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| 3GPP TR 38.899 V0.2.0 (2023-03) | |
| Technical Report | |
| 3rd Generation Partnership Project;  Technical Specification Group Radio Access Network;  High power UE for  FR1 NR inter-band CA/DC or NR SUL band combination  with y (1<y<=6) bands DL and x (x=1, 2) bands UL  and power class m (m<3) and high power on TDD band(s);  (Release 18) | |
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# Foreword

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

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

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

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

**shall** indicates a mandatory requirement to do something

**shall not** indicates an interdiction (prohibition) to do something

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

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

**should** indicates a recommendation to do something

**should not** indicates a recommendation not to do something

**may** indicates permission to do something

**need not** indicates permission not to do something

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

**can** indicates that something is possible

**cannot** indicates that something is impossible

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

**will** indicates that something is certain or expected to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

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

**might** indicates a likelihood that something will happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

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

In addition:

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

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

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

# 1 Scope

The present document is a technical report for high power UE for NR inter-band Carrier Aggregation or Dual Connection and NR SUL band combinations with y (1<y<=6) bands downlink and x (x=1, 2) bands uplink under Rel-18 time-frame. The purpose is to gather the relevant background information and studies in order to complete the band-combination specific requirements for the newly requested band combinations for power class 2 and power class 1.5 UE. Table 1-1 lists the three types of band combinations covered by this TR.

**Table 1-1 High power UE inter-band CA/DC and SUL band combinations**

|  |  |  |
| --- | --- | --- |
| **#** | **Band combination** | **Power class for uplink** |
| 1 | Power class 2 NR Inter-band CA/DC for y bands DL with x bands UL (x=1, 2) | 1UL(TDD): PC2 on TDD band  2UL (FDD+TDD, TDD+FDD, TDD+TDD): PC3 on FDD band, PC2 or PC3 on TDD band |
| 2 | Power class 1.5 NR Inter-band CA for y bands DL with 1 band UL | 1UL (TDD): PC1.5 on TDD band |
| 3 | Power class 2 SUL band combinations with or without CA for y bands DL with 2 bands UL | SUL: PC3 on SUL band  NUL(TDD): PC2 on TDD band  NUL = Normal Uplink in contrast to SUL. |

# 2 References

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

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

- For a specific reference, subsequent revisions do not apply.

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

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP RP-222623: “New WID: High power UE for FR1 NR inter-band CA/DC or NR SUL (supplementary uplink) band combination with y bands downlink (1<y<=6) and x bands uplink (x=1,2) and power class m (m<3) and high power on TDD band(s)”.

[3] 3GPP TS 38.101-1: "NR; User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone".

[4] 3GPP TR 37.865-01-01: “NR Carrier Aggregation for intra-band (m Down Link (DL) / 1 Up Link (UL) bands) and inter-band (n Down Link (DL) / 1 Up Link (UL) bands)”

…

[x] <doctype> <#>[ ([up to and including]{yyyy[-mm]|V<a[.b[.c]]>}[onwards])]: "<Title>".

# 3 Definitions of terms, symbols and abbreviations

## 3.1 Terms

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

**example:** text used to clarify abstract rules by applying them literally.

## 3.2 Symbols

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

<symbol> <Explanation>

ΔRIB,c Allowed reference sensitivity relaxation due to support for inter-band CA operation, for serving cell *c*.

ΔTIB,c Allowed maximum configured output power relaxation due to support for inter-band CA operation, for serving cell *c*.

## 3.3 Abbreviations

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

<ABBREVIATION> <Expansion>

BS Base Station

BCS Bandwidth Combination Set

CA Carrier Aggregation

CC Component Carriers

DC Dual Connectivity

DL Downlink

FDD Frequency Division Duplex

MPR Allowed maximum power reduction

MSD Maximum Sensitivity Degradation

REFSENS Reference Sensitivity power level

SCS Subcarrier spacing

TDD Time Division Duplex

UE User Equipment

UL Uplink

# 4 Background

At 3GPP RAN4#97-e meeting, a basket Work Item on “High power UE for FR1 NR inter-band CA/DC or NR SUL (supplementary uplink) band combination with y bands downlink (1<y<=6) and x bands uplink (x=1,2) and power class m (m<3) and high power on TDD band(s)” [2] was approved for Rel-18. The objectives of the core part are as follows:

Specify the band-combination specific RF requirements for all listed band combinations as defined in attached excel file of this WI.

The requirements that need to analyse and specify include

- Maximum output power.

- Analysing combinations that have self-desensitization, applicable ∆TIB, c and ∆RIB, c and reference sensitivity exceptions including MSD test cases.

- Other additional impact to the requirements due to the high power on UL, if necessary

The present document is a technical report for this basket Work Item.

## 4.1 TR Maintenance

A single company is responsible for introducing all approved TPs in the current TR, i.e. TR editor. However, it is the responsibility of the contact person of each band/band combination to ensure that the TPs related to the band/band combination have been implemented.

# 5 High Power UE CA of 2 bands DL and 1 or 2 bands UL

## 5.x CA\_nX-nY

### 5.x.1 Configurations

*<Editor’s note: the CA configurations and bandwidth combinations sets should be kept same as defined in 38.101-1 Table 5.5A.3.1-1x unless additional clarification>*

**Table 5.x.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (two bands)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration or  single uplink carrier | NR Band | Channel bandwidth (MHz) | Bandwidth combination set |
| *CA\_nX-nY* | *nX8,9, nY8,9,*  *CA\_nX-nY8* | *nX* |  |  |
| *nY* |  |
| NOTE 8: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 9: Power Class 1.5 is allowed for this single uplink carrier in this downlink/uplink combination | | | | |

### 5.x.2 Maximum output power

*<Editor’s note: In table 5.x.2-1, the power class 2 cases supported by the uplink CA should be kept as the same numbering and others that not supported should be removed. >*

Table 5.x.2-1 UE Power Class 2 for uplink inter-band CA (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Uplink CA configuration** | **Power class 2 cases for CA\_nX-nY** | **CA power class** | **Carrier X power class** | **Carrier Y power class** |
| *CA\_nX-nY* | *Case a* | *26dBm* | *23dBm* | *23dBm* |
| *Case b* | *26dBm* | *23dBm* | *26dBm* |
| *Case c* | *26dBm* | *26dBm* | *23dBm* |
| *Case d* | *26dBm* | *26dBm* | *26dBm* |

### 5.x.3 REFSENS requirements

*<Editor’s note: This agenda will capture the Reference sensitivity exceptions or MSD requirements due to higher power for CA carrier, please use the same table format as in 38101-1. >*

#### 5.x.3.1 Power class 2 case a

#### 5.x.3.2 Power class 2 case b

#### 5.x.3.3 Power class 2 case c

#### 5.x.3.4 Power class 1.5 for single uplink nX

#### 5.x.3.5 Power class 1.5 for single uplink nY

### 5.x.4 ∆TIB and ∆RIB values

*<Editor’s note: If no change by comparing to the values for power class 3 CA, this section will be void.>*

## 5.1 CA\_n25-n41C

### 5.1.1 Configurations

Table 5.1.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration or  single uplink carrier | NR Band | Channel bandwidth (MHz) | Bandwidth combination set |
| CA\_n25(2A)-n41C | n418, 9  CA\_n25A-n41A8  **CA\_n41C8** | n25 | CA\_n25(2A)\_BCS 4 and 5 | 4 and 5 |
|  |  | n41 | CA\_n41C\_BCS 4 and 5 |  |
| CA\_n25A-n41C | n418, 9  CA\_n25A-n41A8  **CA\_n41C8** | n25 | n25 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n41 | CA\_n41C\_BCS 4 and 5 |  |
| NOTE 8: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 9: Power Class 1.5 is allowed for this single uplink carrier in this downlink/uplink combination | | | | |

### 5.1.2 Maximum output power

Table 5.1.2-1 UE Power Class 2 for uplink inter-band CA (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Uplink CA configuration** | **Power class 2 cases for CA\_nC** | **CA power class** | **Carrier X power class** | **Carrier Y power class** |
| CA\_n41C | Case a | 26dBm | 23dBm | 23dBm |
| Case b | 26dBm | 23dBm | 26dBm |
| Case c | 26dBm | 26dBm | 23dBm |
| Case d | 26dBm | 26dBm | 26dBm |

### 5.1.3 REFSENS requirements

#### 5.1.3.1 Power class 2 case a, b, c, d

The MSD for PC3 CA\_n41C into n25:

Table 5.1.3-1 PC3 MSD

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n25-n41 | n25 | N/A | 5 | N/A | 1992.5 | 8.5 | FDD | IMD7 |
|  | n41 | 2545 | 90 | 1 (RBstart=0) | 2545 | N/A | TDD | N/A |
|  |  | 2640 | 100 | 1 (RBstart=221) | 2640 |  |  |  |

For PC2 there should be no difference because for these we have assumed that MPR is applied to meet the SEM mask and thus IMD3 is -13dBm, IMD5 is -25dBm for NS04 and -30dBm for NS01 and then we decay the power of the higher IMDs

The proposed value for PC2 UL CA MSD can be found in Table 5.1.3-2:

Table 5.1.3-2 PC2 MSD

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n25-n41 | n25 | N/A | 5 | N/A | 1992.5 | 8.5 | FDD | IMD7 |
|  | n41 | 2545 | 90 | 1 (RBstart=0) | 2545 | N/A | TDD | N/A |
|  |  | 2640 | 100 | 1 (RBstart=221) | 2640 |  |  |  |

### 5.1.4 ∆TIB and ∆RIB values

Void

## 5.2 CA\_n41C-n66

### 5.2.1 Configurations

Table 5.2.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration or  single uplink carrier | NR Band | Channel bandwidth (MHz) | Bandwidth combination set |
| CA\_n41C-n66A | n418, 9  n418, 9  **CA\_n41C8**  CA\_n41A-n66A8 | n41 | CA\_n41C\_BCS 4 and 5 | 4 and 5 |
|  |  | n66 | n66 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n41C-n66(2A) | n418, 9  **CA\_n41C8**  CA\_n41A-n66A8 | n41 | CA\_n41C\_BCS 4 and 5 | 4 and 5 |
|  |  | n66 | CA\_n66(2A)\_BCS 4 and 5 |  |
| NOTE 8: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 9: Power Class 1.5 is allowed for this single uplink carrier in this downlink/uplink combination | | | | |

### 5.2.2 Maximum output power

Table 5.2.2-1 UE Power Class 2 for uplink inter-band CA (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Uplink CA configuration** | **Power class 2 cases for CA\_nC** | **CA power class** | **Carrier X power class** | **Carrier Y power class** |
| CA\_n41C | Case a | 26dBm | 23dBm | 23dBm |
| Case b | 26dBm | 23dBm | 26dBm |
| Case c | 26dBm | 26dBm | 23dBm |
| Case d | 26dBm | 26dBm | 26dBm |

### 5.2.3 REFSENS requirements

#### 5.2.3.1 Power class 2 case a, b, c, d

The MSD for PC3 CA\_n41C into n66:

Table 5.2.3-1 PC3 MSD

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n41-n66 | CA\_n41C | n4112 | 2545 | 90 | 1 (RBstart=0) | 2545 | N/A | TDD | N/A |
|  |  |  | 2640 | 100 | 1 (RBstart=171) | 2640 |  |  |  |
|  |  | n66 | N/A | 5 | N/A | 2197.5 | 32.5 | FDD | IMD5 |

For PC2 there should be no difference because for these we have assumed that MPR is applied to meet the SEM mask and thus IMD3 is -13dBm, IMD5 is -25dBm for NS04 and -30dBm for NS01 and then we decay the power of the higher IMDs

The proposed value for PC2 UL CA MSD can be found in Table 5.2.3-2:

Table 5.2.3-2 PC2 MSD

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n41-n66 | CA\_n41C | n4112 | 2545 | 90 | 1 (RBstart=0) | 2545 | N/A | TDD |
|  |  |  | 2640 | 100 | 1 (RBstart=171) | 2640 |  |  |
|  |  | n66 | N/A | 5 | N/A | 2197.5 | 32.5 | FDD |

### 5.2.4 ∆TIB and ∆RIB values

Void

## 5.3 CA\_n41C-n71

### 5.3.1 Configurations

Table 5.3.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration or  single uplink carrier | NR Band | Channel bandwidth (MHz) | Bandwidth combination set |
| CA\_n41C-n71A | n418, 9  **CA\_n41C**8  CA\_n41A-n71A8 | n41 | CA\_n41C\_BCS 4 and 5 | 4 and 5 |
|  |  | n71 | n71 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n41C-n71(2A) | n418,9  **CA\_n41C**8  CA\_n41A-n71A8 | n41 | CA\_n41C\_BCS 4 and 5 | 4 and 5 |
|  |  | n71 | CA\_n71(2A)\_BCS 4 and 5 |  |
| CA\_n41C-n71B | n418,9  **CA\_n41C**8  CA\_n41A-n71A8 | n41 | CA\_n41C\_BCS 4 and 5 | 4 and 5 |
|  |  | n71 | CA\_n71B\_BCS 4 and 5 |  |
| NOTE 8: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 9: Power Class 1.5 is allowed for this single uplink carrier in this downlink/uplink combination | | | | |

Note: DL CA\_n41C-n71(2A) with UL CA\_n41C is not in 38.101-1 17.7.0, but it was in agreed CR R4-2214650 From RAN4#104-e.

### 5.3.2 Maximum output power

Table 5.3.2-1 UE Power Class 2 for uplink inter-band CA (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Uplink CA configuration** | **Power class 2 cases for CA\_nC** | **CA power class** | **Carrier X power class** | **Carrier Y power class** |
| CA\_n41C | Case a | 26dBm | 23dBm | 23dBm |
| Case b | 26dBm | 23dBm | 26dBm |
| Case c | 26dBm | 26dBm | 23dBm |
| Case d | 26dBm | 26dBm | 26dBm |

### 5.3.3 REFSENS requirements

#### 5.3.3.1 Power class 2 case a, b, c, d

For PC3 CA\_n41C there is no MSD into n71.

For PC2 CA\_n41C there should be no MSD into n71.

### 5.3.4 ∆TIB and ∆RIB values

Void

## 5.4 CA\_n41C-n77A

### 5.4.1 Configurations

Table 5.4.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration or  single uplink carrier | NR Band | Channel bandwidth (MHz) | Bandwidth combination set |
| CA\_n41C-n77A | n418,9  n778,9  CA\_n41A-n77A8  **CA\_n41C8** | n41 | n41 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n77 | n77 channel bandwidths in Table 5.3.5-1 |  |
| NOTE 8: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 9: Power Class 1.5 is allowed for this single uplink carrier in this downlink/uplink combination | | | | |

### 5.4.2 Maximum output power

Table 5.4.2-1 UE Power Class 2 for uplink inter-band CA (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Uplink CA configuration** | **Power class 2 cases for CA\_nC** | **CA power class** | **Carrier X power class** | **Carrier Y power class** |
| CA\_n41C | Case a | 26dBm | 23dBm | 23dBm |
| Case b | 26dBm | 23dBm | 26dBm |
| Case c | 26dBm | 26dBm | 23dBm |
| Case d | 26dBm | 26dBm | 26dBm |

### 5.4.3 REFSENS requirements

#### 5.4.3.1 Power class 2 case a, b, c, d

The MSD for PC3 CA\_n41C into n77:

Table 5.4.3-1 PC3 MSD

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n41-n77 | n4112 | 2545 | 60 | 1 (RBstart=0) | 2545 | N/A | TDD | N/A |
|  |  | 2625 | 100 | 1 (RBstart=272) | 2625 |  |  |  |
|  | n77 | N/A | 10 | N/A | 3305 | 2.7 | FDD | IMD9 |

For PC2 there should be no difference because for these we have assumed that MPR is applied to meet the SEM mask and thus IMD3 is -13dBm, IMD5 is -25dBm for NS04 and -30dBm for NS01 and then we decay the power of the higher IMDs

The proposed value for PC2 UL CA MSD can be found in Table 5.4.3-2.

Table 5.4.3-2 PC2 MSD

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n41-n77 | n4112 | 2545 | 60 | 1 (RBstart=0) | 2545 | N/A | TDD | N/A |
|  |  | 2625 | 100 | 1 (RBstart=272) | 2625 |  |  |  |
|  | n77 | N/A | 10 | N/A | 3305 | 2.7 | FDD | IMD9 |

### 5.4.4 ∆TIB and ∆RIB values

Void

## 5.5 CA\_n77-n79

### 5.5.1 Configurations

The minimum requirements apply only when there is non-simultaneous Rx/Tx operation between n77-n79 NR carriers. This restriction applies also for these carriers when applicable NR CA configuration is part of a higher order configuration. These are shown in Table 5.2A.2.1-1 of TS 38.101-1 [3].

Table 5.5.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration or  single uplink carrier | NR Band | Channel bandwidth (MHz) | Bandwidth combination set |
| CA\_n77A-n79A | n77A8,9, n79A8,9 | n77 | 10, 15, 20, 40, 50, 60, 80, 90, 100 | 0 |
| n79 | 40, 50, 60, 80, 100 |
| NOTE 8: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 9: Power Class 1.5 is allowed for this single uplink carrier in this downlink/uplink combination | | | | |

### 5.5.2 Maximum output power

This band combination does not support high power UL CA, so this section is omitted.

### 5.5.3 REFSENS requirements

Analysis of REFSENS exceptions or MSD requirements is needed due to higher power uplink. For PC3 CA\_n77-n79 with single uplink, the co-existence study is provided in TR 37.865-01-01 [4]. Analysis is based on this study.

#### 5.5.3.1 Power class 2 for single uplink n77

Based on above,

- the 2nd, 3rd, 4th, and 5th order harmonic do not fall into Rx frequencies of n79.

- the 2nd, 3rd, 4th, and 5th order harmonic mixing do not fall into Rx frequencies of n79.

Therefore, there is no MSD issue for this CA configuration.

#### 5.5.3.2 Power class 2 for single uplink n79

Based on above,

- the 2nd, 3rd, 4th, and 5th order harmonic do not fall into Rx frequencies of n77.

- the 2nd, 3rd, 4th, and 5th order harmonic mixing do not fall into Rx frequencies of n77.

Therefore, there is no MSD issue for this CA configuration.

#### 5.5.3.3 Power class 1.5 for single uplink n77

Based on above,

- the 2nd, 3rd, 4th, and 5th order harmonic do not fall into Rx frequencies of n79.

- the 2nd, 3rd, 4th, and 5th order harmonic mixing do not fall into Rx frequencies of n79.

Therefore, there is no MSD issue for this CA configuration.

#### 5.5.3.4 Power class 1.5 for single uplink n79

Based on above,

- the 2nd, 3rd, 4th, and 5th order harmonic do not fall into Rx frequencies of n77.

- the 2nd, 3rd, 4th, and 5th order harmonic mixing do not fall into Rx frequencies of n77.

Therefore, there is no MSD issue for this CA configuration.

### 5.5.4 ∆TIB and ∆RIB values

There is no change by comparing to the values for PC3 CA, so this section is omitted.

## 5.6 CA\_n78-n79

### 5.6.1 Configurations

For UEs supporting band n77, the minimum requirements apply only when there is non-simultaneous Rx/Tx operation between n78-n79 NR carriers. This restriction applies also for these carriers when applicable NR CA configuration is part of a higher order configuration. These are shown in Table 5.2A.2.1-1 of TS 38.101-1 [3].

Table 5.6.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration or  single uplink carrier | NR Band | Channel bandwidth (MHz) | Bandwidth combination set |
| CA\_n78A-n79A | n78A8,9, n79A8,9 | n78 | 10, 15, 20, 40, 50, 60, 80, 90, 100 | 0 |
| n79 | 40, 50, 60, 80, 100 |
| NOTE 8: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 9: Power Class 1.5 is allowed for this single uplink carrier in this downlink/uplink combination | | | | |

### 5.6.2 Maximum output power

This band combination does not support high power UL CA, so this section is omitted.

### 5.6.3 REFSENS requirements

Analysis of REFSENS exceptions or MSD requirements is needed due to higher power uplink. For PC3 CA\_n78-n79 with single uplink, the co-existence study is provided in TR 37.865-01-01 [4]. In addition, MSD due to cross band isolation is needed for UEs supporting the inter-band carrier aggregation with simultaneous Rx/Tx capability.

#### 5.6.3.1 Power class 2 for single uplink n78

Based on above,

- the 2nd, 3rd, 4th, and 5th order harmonic do not fall into Rx frequencies of n79.

- the 2nd, 3rd, 4th, and 5th order harmonic mixing do not fall into Rx frequencies of n79.

For MSD due to cross band isolation, MSD value of PC2 case will be 3dB higher than that of PC3 case. New MSD values are shown in Table 5.6.3-1 below.

Table 5.6.3-1: Reference sensitivity exceptions (MSD) and uplink/downlink configurations due to cross band isolation from a PC2 aggressor NR UL band for NR CA FR1

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **UL band** | **DL band** | **UL Fc** | **UL BW** | **SCS of UL band** | **UL RB Allocation** | **DL Fc** | **DL BW** | **MSD** | **Cross-band**  **Interference**  **source** |
| **(MHz)** | **(MHz)** | **(kHz)** | **LCRB** | **(MHz)** | **(MHz)** | **(dB)** |
| n78X1 | n79 | 3750 | 100 | 30 | 270 (RBstart=3) | 4420 | 40 | 5 | >ACLR2 |
| n78X1 | n79 | 3750 | 100 | 30 | 270 (RBstart=3) | 4450 | 100 | 5 | >ACLR2 |
| NOTE X1: The requirements only apply for UEs supporting inter-band carrier aggregation with simultaneous Rx/Tx capability. Simultaneous Rx/Tx capability does not apply for UEs supporting band n78 with a n77 implementation. | | | | | | | | | |

#### 5.6.3.2 Power class 2 for single uplink n79

Based on above,

- the 2nd, 3rd, 4th, and 5th order harmonic do not fall into Rx frequencies of n78.

- the 2nd, 3rd, 4th, and 5th order harmonic mixing do not fall into Rx frequencies of n78.

For MSD due to cross band isolation, MSD value of PC2 case will be 3dB higher than that of PC3 case. New MSD values are shown in Table 5.6.3-2 below.

Table 5.6.3-2: Reference sensitivity exceptions (MSD) and uplink/downlink configurations due to cross band isolation from a PC2 aggressor NR UL band for NR CA FR1

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **UL band** | **DL band** | **UL Fc** | **UL BW** | **SCS of UL band** | **UL RB Allocation** | **DL Fc** | **DL BW** | **MSD** | **Cross-band**  **Interference**  **source** |
| **(MHz)** | **(MHz)** | **(kHz)** | **LCRB** | **(MHz)** | **(MHz)** | **(dB)** |
| n79 | n78X1 | 4450 | 100 | 30 | 270 (RBstart=0) | 3795 | 10 | 5.6 | >ACLR2 |
| n79 | n78X1 | 4450 | 100 | 30 | 270 (RBstart=0) | 3750 | 100 | 5.6 | >ACLR2 |
| NOTE X1: The requirements only apply for UEs supporting inter-band carrier aggregation with simultaneous Rx/Tx capability. Simultaneous Rx/Tx capability does not apply for UEs supporting band n78 with a n77 implementation. | | | | | | | | | |

#### 5.6.3.3 Power class 1.5 for single uplink n78

Based on above,

- the 2nd, 3rd, 4th, and 5th order harmonic do not fall into Rx frequencies of n79.

- the 2nd, 3rd, 4th, and 5th order harmonic mixing do not fall into Rx frequencies of n79.

For MSD due to cross band isolation, MSD value of PC1.5 case will be 6dB higher than that of PC3 case. New MSD values are shown in Table 5.6.3-3 below.

Table 5.6.3-3: Reference sensitivity exceptions (MSD) and uplink/downlink configurations due to cross band isolation from a PC1.5 aggressor NR single UL band for DL NR CA FR1

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **UL band** | **DL band** | **UL Fc** | **UL BW** | **SCS of UL band** | **UL RB Allocation** | **DL Fc** | **DL BW** | **MSD** | **Cross-band**  **Interference**  **source** |
| **(MHz)** | **(MHz)** | **(kHz)** | **LCRB** | **(MHz)** | **(MHz)** | **(dB)** |
| n78X1 | n79 | 3750 | 100 | 30 | 270 (RBstart=3) | 4420 | 40 | 8 | >ACLR2 |
| n78X1 | n79 | 3750 | 100 | 30 | 270 (RBstart=3) | 4450 | 100 | 8 | >ACLR2 |
| NOTE X1: The requirements only apply for UEs supporting inter-band carrier aggregation with simultaneous Rx/Tx capability. Simultaneous Rx/Tx capability does not apply for UEs supporting band n78 with a n77 implementation. | | | | | | | | | |

#### 5.6.3.4 Power class 1.5 for single uplink n79

Based on above,

- the 2nd, 3rd, 4th, and 5th order harmonic do not fall into Rx frequencies of n78.

- the 2nd, 3rd, 4th, and 5th order harmonic mixing do not fall into Rx frequencies of n78.

For MSD due to cross band isolation, MSD value of PC2 case will be 3dB higher than that of PC3 case. New MSD values are shown in Table 5.6.3-2 below.

Table 5.6.3-4: Reference sensitivity exceptions (MSD) and uplink/downlink configurations due to cross band isolation from a PC1.5 aggressor NR single UL band for DL NR CA FR1

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **UL band** | **DL band** | **UL Fc** | **UL BW** | **SCS of UL band** | **UL RB Allocation** | **DL Fc** | **DL BW** | **MSD** | **Cross-band**  **Interference**  **source** |
| **(MHz)** | **(MHz)** | **(kHz)** | **LCRB** | **(MHz)** | **(MHz)** | **(dB)** |
| n79 | n78X1 | 4450 | 100 | 30 | 270 (RBstart=0) | 3795 | 10 | 8.6 | >ACLR2 |
| n79 | n78X1 | 4450 | 100 | 30 | 270 (RBstart=0) | 3750 | 100 | 8.6 | >ACLR2 |
| NOTE X1: The requirements only apply for UEs supporting inter-band carrier aggregation with simultaneous Rx/Tx capability. Simultaneous Rx/Tx capability does not apply for UEs supporting band n78 with a n77 implementation. | | | | | | | | | |

### 5.6.4 ∆TIB and ∆RIB values

There is no change by comparing to the values for PC3 CA, so this section is omitted.

5.7 CA\_n3-n41

5.7.1 Configurations

**Table 5.7.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (two bands)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **NR CA configuration** | **Uplink CA configuration or**  **single uplink carrier** | **NR Band** | **Channel bandwidth (MHz)** | **Bandwidth combination set** |
| CA\_n3A-n41A | n418,9 | n3 | 5, 10, 15, 20, 25, 30 | 0 |
| n41 | 10, 15, 20, 40, 50, 60, 80, 90, 100 |
| n3 | 5, 10, 15, 20, 25, 30 | 1 |
| n41 | 10, 15, 20, 40, 50, 60 |
| n3 | 5, 10, 15, 20, 25, 30, 40 | 2 |
| n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100 |
| n3 | 5, 10, 15, 20, 25, 30, 40, 50 | 3 |
| n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100 |
| NOTE 8: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 9: Power Class 1.5 is allowed for this single uplink carrier in this downlink/uplink combination | | | | |

5.7.2 Maximum output power

This band combination does not support high power UL CA, so this section is omitted.

5.7.3 REFSENS requirements

Analysis of REFSENS exceptions or MSD requirements is needed due to higher power uplink.

5.7.3.1 Power class 1.5 for single uplink n41

* the 2nd, 3rd, 4th, and 5th order harmonic do not fall into Rx frequencies of n3.
* the 2nd, 3rd, 4th, and 5th order harmonic mixing do not fall into Rx frequencies of n3.
* MSD due to cross band isolation should be defined, PC2 and PC3 of this band combination also suffers this kind of interference.

**Table 5.7.3-1: Reference sensitivity exceptions (MSD) and uplink/downlink configurations due to cross band isolation from a PC2 aggressor NR UL band for NR CA FR1**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **UL band** | **DL band** | **UL Fc** | **UL BW** | **SCS of UL band** | **UL RB Allocation** | **DL Fc** | **DL BW** | **MSD** | **Cross-band**  **Interference**  **source** |
| **(MHz)** | **(MHz)** | **(kHz)** | **LCRB** | **(MHz)** | **(MHz)** | **(dB)** |
| n41 | n3 | 2546 | 100 | 30 | 270 (RBstart=0) | 1877.5 | 5 | 3.9 | >ACLR2 |

5.7.4 ∆TIB and ∆RIB values

There is no change by comparing to the values for PC3 CA, so this section is omitted.

5.8 CA\_n3-n77

5.8.1 Configurations

**Table 5.8.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (two bands)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **NR CA configuration** | **Uplink CA configuration or**  **single uplink carrier** | **NR Band** | **Channel bandwidth (MHz)** | **Bandwidth combination set** |
| CA\_n3A-n77A | n778,9  CA\_n3A-n77A8 | n3 | 5, 10, 15, 20, 25, 30 | 0 |
| n77 | 10, 15, 20, 40, 50, 60, 80, 90, 100 |
| CA\_n3A-n77(2A) | CA\_n77(2A)  CA\_n3A-n77A8 | n3 | 5, 10, 15, 20, 25, 30 | 0 |
| n77 | CA\_n77(2A)\_BCS0 |
| NOTE 8: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 9: Power Class 1.5 is allowed for this single uplink carrier in this downlink/uplink combination | | | | |

5.8.2 Maximum output power

**Table 5.8.2-1 UE Power Class 2 for uplink inter-band CA (two bands)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Uplink CA configuration** | **Power class 2 cases for CA\_nC** | **CA power class** | **Carrier X power class** | **Carrier Y power class** |
| CA\_n3-n77 | Case a | 26dBm | 23dBm | 23dBm |
| Case b | 26dBm | 23dBm | 26dBm |

5.8.3 REFSENS requirements

Analysis of REFSENS exceptions or MSD requirements is needed due to higher power uplink.

5.8.3.1 Power class 2 case a, b

Based on calculation, IMD 2, 4, 5 of dual UL falls into n3 DL, the MSD exception is defined as below, the values are reused from CA\_n3-n78.

**Table 5.8.3-1: 2DL/2UL inter-band Reference sensitivity QPSK PREFSENS and uplink/downlink configurations for PC2 CA**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Band / Channel bandwidth / NRB / Duplex mode** | | | | | | | | **Source of IMD** |
| **NR CA**  **Configuration** | **NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL  CLRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** |  |
| CA\_n3-n774 | n3 | 1740 | 5 | 25 | 1835 | 31.9 | FDD | IMD2 |
| n77 | 3575 | 10 | 50 | 3575 | N/A | TDD | N/A |
| n3 | 1765 | 5 | 25 | 1860 | 18.5 | FDD | IMD4 |
| n77 | 3435 | 10 | 50 | 3435 | N/A | TDD | N/A |
| NOTE 4: This band is subject to IMD5 also which MSD is not specified. | | | | | | | | |

5.8.3.2 Power class 2 for single uplink n77

* the 2nd, 3rd, 4th, and 5th order harmonic do not fall into Rx frequencies of n3.
* the 2th order harmonic mixing falls into Rx frequencies of n3.

Therefore, MSD issue due to harmonic mixing from PC2 n77 UL falling into n3 DL should be defined, the value is reused from CA\_n3-n78.

**Table 5.8.3.2-1: Reference sensitivity exceptions and uplink/downlink configurations due to harmonic mixing from a PC2 aggressor NR UL band for NR DL CA FR1**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **UL band** | **DL band** | **UL BW** | **SCS of UL band** | **UL RB Allocation** | **DL BW** | **MSD** | **UL/DL fc condition** | **UL/DL harmonic order** |
| **(MHz)** | **(kHz)** | **LCRB** | **(MHz)** | **(dB)** |
| n77 | n3 | 5 | 15 | 25 (RBstart=0) | 5 | 8.1 | NOTE 4 | UL1/DL2 |
| n77 | n3 | 40 | 15 | 216 (RBstart=0) | 40 | 1 | NOTE 4 | UL1/DL2 |

5.8.3.3 Power class 1.5 for single uplink n77

* the 2nd, 3rd, 4th, and 5th order harmonic do not fall into Rx frequencies of n3.
* the 2th order harmonic mixing falls into Rx frequencies of n3.

Therefore, MSD issue due to harmonic mixing from PC1.5 n77 UL falling into n3 DL should be defined.

**Table 5.8.3.3-1: Reference sensitivity exceptions and uplink/downlink configurations due to harmonic mixing from a PC1.5 aggressor NR UL band for NR DL CA FR1**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **UL band** | **DL band** | **UL BW** | **SCS of UL band** | **UL RB Allocation** | **DL BW** | **MSD** | **UL/DL fc condition** | **UL/DL harmonic order** |
| **(MHz)** | **(kHz)** | **LCRB** | **(MHz)** | **(dB)** |
| n77 | n3 | 5 | 15 | 25 (RBstart=0) | 5 | 11.1 | NOTE 4 | UL1/DL2 |
| n77 | n3 | 40 | 15 | 216 (RBstart=0) | 40 | 4 | NOTE 4 | UL1/DL2 |

5.8.4 ∆TIB and ∆RIB values

There is no change by comparing to the values for PC3 CA, so this section is omitted.

5.9 CA\_n8-n78

5.9.1 Configurations

**Table 5.9.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (two bands)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **NR CA configuration** | **Uplink CA configuration or**  **single uplink carrier** | **NR Band** | **Channel bandwidth (MHz)** | **Bandwidth combination set** |
| CA\_n8A-n78A | n788  CA\_n8A-n78A8 | n8 | 5, 10, 15, 20 | 0 |
|  |  | n78 | 10, 15, 20, 40, 50, 60, 80, 90, 100 |  |
|  |  | n8 | 5, 10, 15, 20 | 1 |
|  |  | n78 | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100 |  |
| NOTE 8: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination | | | | |

5.9.2 Maximum output power

**Table 5.9.2-1 UE Power Class 2 for uplink inter-band CA (two bands)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Uplink CA configuration** | **Power class 2 cases for CA\_n8-n78** | **CA power class** | **Carrier n8 power class** | **Carrier n78 power class** |
| CA\_n8-n78 | Case a | 26dBm | 23dBm | 23dBm |
| Case b | 26dBm | 23dBm | 26dBm |

5.9.3 REFSENS requirements

For PC2 CA\_n8-n78, the co-existence studies on the harmonic issue and intermodulation issues are the same with the PC3 CA\_n8-n78, where:

4th harmonic frequency of band 8 UL may fall into band n78 DL Rx

4th IMD frequencies (i.e. 3\*f8-fn78) may fall into band 8 DL Rx

4th Harmonic mixing issue, i.e. Band n78 UL may fall into 4th receiver harmonic mixing frequency of band n8

It shall be noted that the MSD values for the above two types of MSD have already been defined for PC3 CA\_n8-n78 configuration in TS38.101-1 specification.

5.9.3.1 Power class 2 case a

For PC2 case a, since the power configuration for each band is 23dBm, therefore:

For the harmonic issue, comparing with PC3 CA\_n8A-n78A, no additional MSD are expected for this PC2 CA\_n8A-n78A with 1 uplink carrier.

For the harmonic mixing issue, comparing with PC3 CA\_n8A-n78A, no additional MSD are expected for this PC2 CA\_n8A-n78A.

For the IMD issue, comparison of the NOTE 1 in Table 7.3A.5-1 (for PC3 2UL/2DL) and Table 7.3A.5-1a (for PC2 2UL/2DL) in TS38.101-1, it can be found that the set for both transmitters is changed from min(+20 dBm, PCMAX\_L,f,c) to min(+23 dBm, PCMAX\_L,f,c), which means the IMD4 MSD for PC2 2UL/2DL CA\_n8A-n78A should be defined additionally.

The IMD4 MSD for PC2 2UL/2DL CA\_n8A-n78A is proposed to be defined in table 5.9.3.1-1, by reusing the same IMD4 MSD of PC2 2UL/2DL DC\_8A\_n78A.

**Table 5.9.3.1-1 2DL/2UL inter-band Reference sensitivity QPSK PREFSENS and uplink/downlink configurations for PC2 CA**

| NR Band / Channel bandwidth / NRB / MSD | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NR CA Configuration | NR band | UL Fc  (MHz) | UL/DL BW  (MHz) | UL  LCRB | DL Fc (MHz) | MSD  (dB) | IMD order |
| CA\_n8-n78 | n8 | 897.5 | 5 | 25 | 942.5 | 15.5 | IMD4 |
|  | n78 | 3635 | 10 | 50 | 3635 | N/A | N/A |

5.9.3.2 Power class 2 case b

For PC2 case b, similar with case a, no additional harmonic MSD are expected for this PC2 CA\_n8A-n78A with 1 uplink carrier since the power of band n8 is kept as 23dBm.

For PC2 case b, the harmonic mixing issue, comparing with PC3 CA\_n8A-n78A, additional MSD are expected for this PC2 CA\_n8A-n78A since the power of band n78 is increased to 26dBm. The harmonic mixing MSD for PC2 CA\_n8A-n78A is defined in table 5.9.3.2-1 by referring to the same MSD of PC2 CA\_n5A-n77A.

Table 5.9.3.2-1: Reference sensitivity exceptions and uplink/downlink configurations due to harmonic mixing from a PC2 aggressor NR UL band for NR DL CA FR1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **UL band** | **DL band** | **UL BW** | **SCS of UL band** | **UL RB Allocation** | **DL BW** | **MSD** | **UL/DL fc condition** | **UL/DL harmonic order** |
| **(MHz)** | **(kHz)** | **LCRB** | **(MHz)** | **(dB)** |
| n77 | n8 | 10 | 15 | 25 (RBstart=0) | 5 | 8.1 | NOTE 5 | UL1/DL4 |
| n77 | n8 | 20 | 15 | 20 (RBstart=0) | 20 | 4.3 | NOTE 5 | UL1/DL4 |
| NOTE 5: The requirements should be verified for UL NR-ARFCN of the aggressor (higher) band (superscript HB) such that  in MHz and  with  the carrier frequency in the victim (lower) band and  the channel bandwidth configured in the higher band. | | | | | | | | |

Regarding the power configuration of 23dBm+26dBm in case b, due to the set for both transmitters for MSD calculation is the same, i.e. min(+23 dBm, PCMAX\_L,f,c), as 23+23dBm power configuration in case a, so the IMD4 MSD value defined in table 5.9.3.1-1 can be applied.

5.9.4 ∆TIB and ∆RIB values

For the ∆TIB,c and ∆RIB,c values, same PC3 CA\_n8A-n78A requirements are applied for PC2 CA\_n8A-n78A.

5.10 CA\_n40-n77

5.10.1 Configurations

**Table 5.10.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (two bands)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **NR CA configuration** | **Uplink CA configuration or**  **single uplink carrier** | **NR Band** | **Channel bandwidth (MHz)** | **Bandwidth combination set** |
| CA\_n40A-n77A | n778 | n40 | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100 | 0 |
| n77 | 10, 15, 20, 25, 30, 40, 50, 60, 704,80, 904, 100 |
| NOTE 8: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 9: Power Class 1.5 is allowed for this single uplink carrier in this downlink/uplink combination | | | | |

5.10.2 Maximum output power

This band combination does not support high power UL CA, so this section is omitted.

5.10.3 REFSENS requirements

Analysis of REFSENS exceptions or MSD requirements is needed due to higher power uplink.

5.10.3.1 Power class 2 for single uplink n77

* The 2nd, 3rd, 4th, and 5th order harmonic do not fall into Rx frequencies of n40.
* The 2nd, 3rd, 4th, and 5th order harmonic mixing do not fall into Rx frequencies of n40.
* n40 DL suffers UL2/DL3 harmonic mixing from n77.
* Cross band isolation of n77 UL falls into n40 DL.

Therefore, MSD issue for cross band isolation due to higher power on single n77 UL should be defined.

**Table 5.10.3-1: Reference sensitivity exceptions (MSD) and uplink/downlink configurations due to cross band isolation from a PC2 aggressor NR UL band for NR CA FR1**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **UL band** | **DL band** | **UL Fc** | **UL BW** | **SCS of UL band** | **UL RB Allocation** | **DL Fc** | **DL BW** | **MSD** | **Cross-band**  **Interference**  **source** |
| **(MHz)** | **(MHz)** | **(kHz)** | **LCRB** | **(MHz)** | **(MHz)** | **(dB)** |
| n77 | n401 | 3350 | 100 | 30 | 270 (RBstart=0) | 2397.5 | 10 | 6.5 | >ACLR2 |
| n77 | n401 | 3350 | 100 | 30 | 270 (RBstart=0) | 2350 | 100 | 6.5 | >ACLR2 |

**Table 5.10.3.2-2: Reference sensitivity exceptions and uplink/downlink configurations due to harmonic mixing from a PC2 aggressor NR UL band for NR DL CA FR1**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **UL band** | **DL band** | **UL BW** | **SCS of UL band** | **UL RB Allocation** | **DL BW** | **MSD** | **UL/DL fc condition** | **UL/DL harmonic order** |
| **(MHz)** | **(kHz)** | **LCRB** | **(MHz)** | **(dB)** |
| n77 | n40 | 20 | 30 | 50 (RBstart=0) | 10 | 13.2 | NOTE 3 | UL2/DL3 |
| n77 | n40 | 20 | 30 | 50 (RBstart=0) | 100 | 4.4 | NOTE 3 | UL2/DL3 |

5.10.4 ∆TIB and ∆RIB values

There is no change by comparing to the values for PC3 CA, so this section is omitted.

# 6 High Power UE CA of 3 bands DL and 1 or 2 bands UL

## 6.x CA\_nX-nY-nZ

### 6.x.1 Configurations

*<Editor’s note: the CA configurations and bandwidth combinations sets should be kept same as defined in 38.101-1 Table 5.5A.3.2-1x unless additional clarification>*

**Table 6.x.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration or  single uplink carrier | NR Band | Channel bandwidth (MHz) | Bandwidth combination set |
| *CA\_nX-nY-nZ* | *nX7,9, nY7,9,*  *CA\_nX-nY7* | *nX* |  |  |
| *nY* |  |
| *nZ* |  |
| NOTE 7: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 9: Power Class 1.5 is allowed for this single uplink carrier in this downlink/uplink combination | | | | |

### 6.x.2 Maximum output power

*<Editor’s note: In table 6.x.2-1, the power class 2 cases supported by the uplink CA should be kept as the same numbering and others that not supported should be removed. >*

Table 6.x.2-1 UE Power Class 2 for uplink inter-band CA (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Uplink CA configuration** | **Power class 2 cases for CA\_nX-nY** | **CA power class** | **Carrier X power class** | **Carrier Y power class** |
| *CA\_nX-nY* | *Case a* | *26dBm* | *23dBm* | *23dBm* |
| *Case b* | *26dBm* | *23dBm* | *26dBm* |
| *Case c* | *26dBm* | *26dBm* | *23dBm* |
| *Case d* | *26dBm* | *26dBm* | *26dBm* |

### 6.x.3 REFSENS requirements

*<Editor’s note: This agenda will capture the Reference sensitivity exceptions or MSD requirements due to higher power for CA carrier, please use the same table format as in 38101-1. The requirements in this TR are intended to be power class 2 cases based, however how to address in the spec will be further discussed. >*

#### 6.x.3.1 Power class 2 case a

### 6.x.4 ∆TIB and ∆RIB values

*<Editor’s note: If no change by comparing to the values for power class 3 CA, this section will be void.>*

## 6.1 DL CA\_n25-n41-n66, UL CA\_n25A-n41A

### 6.1.1 Configurations

Table 6.1.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration or  single uplink carrier | NR Band | Channel bandwidth (MHz) | Bandwidth combination set |
| CA\_n25A-n41A-n66A | **CA\_n25A-n41A7**  CA\_n25A-n66A  CA\_n41A-n66A | n25 | n25 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n41 | n41 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n66 | n66 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n25A-n41C-n66A | **CA\_n25A-n41A7**  CA\_n25A-n66A  CA\_n41A-n66A | n25 | n25 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n41 | CA\_n41C\_BCS 4 and 5 |  |
|  |  | n66 | n66 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n25A-n41(2A)-n66A | **CA\_n25A-n41A7**  CA\_n25A-n66A  CA\_n41A-n66A | n25 | n25 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n41 | CA\_n41(2A)\_BCS 4 and 5 |  |
|  |  | n66 | n66 channel bandwidths in Table 5.3.5-1 |  |
| NOTE 7: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 9: Power Class 1.5 is allowed for this single uplink carrier in this downlink/uplink combination | | | | |

### 6.1.2 Maximum output power

Table 6.1.2-1 UE Power Class 2 for uplink inter-band CA (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Uplink CA configuration** | **Power class 2 cases for CA\_nX-nY** | **CA power class** | **Carrier X power class** | **Carrier Y power class** |
| CA\_n25A-n41A | Case a | 26dBm | 23dBm | 23dBm |
| Case b | 26dBm | 23dBm | 26dBm |

### 6.1.3 REFSENS requirements

#### 6.1.3.1 Power class 2 case a

Since there is no MSD for PC3 UL CA\_n25A-n41A into CA\_n25-n41-n66, none is proposed for PC2.

#### 6.1.3.2 Power class 2 case b

Since there is no MSD for PC3 UL CA\_n25A-n41A into CA\_n25-n41-n66, none is proposed for PC2.

### 6.1.4 Void

## 6.2 DL CA\_n25-n41-n66, UL CA\_n41A-n66A

### 6.2.1 Configurations

**Table 6.2.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration or  single uplink carrier | NR Band | Channel bandwidth (MHz) | Bandwidth combination set |
| CA\_n25A-n41A-n66A | CA\_n25A-n41A  CA\_n25A-n66A  **CA\_n41A-n66A7** | n25 | n25 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n41 | n41 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n66 | n66 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n25A-n41C-n66A | CA\_n25A-n41A  CA\_n25A-n66A  **CA\_n41A-n66A7** | n25 | n25 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n41 | CA\_n41C\_BCS 4 and 5 |  |
|  |  | n66 | n66 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n25A-n41(2A)-n66A | CA\_n25A-n41A  CA\_n25A-n66A  **CA\_n41A-n66A7** | n25 | n25 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n41 | CA\_n41(2A)\_BCS 4 and 5 |  |
|  |  | n66 | n66 channel bandwidths in Table 5.3.5-1 |  |
| NOTE 7: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 9: Power Class 1.5 is allowed for this single uplink carrier in this downlink/uplink combination | | | | |

### 6.2.2 Maximum output power

Table 6.2.2-1 UE Power Class 2 for uplink inter-band CA (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Uplink CA configuration** | **Power class 2 cases for CA\_nX-nY** | **CA power class** | **Carrier X power class** | **Carrier Y power class** |
| CA\_n41A-n66A | Case a | 26dBm | 23dBm | 23dBm |
| Case c | 26dBm | 26dBm | 23dBm |

### 6.2.3 REFSENS requirements

#### 6.2.3.1 Power class 2 case a

There is 11.0 dB of MSD for PC3 CA\_n41A-n66A into n25:

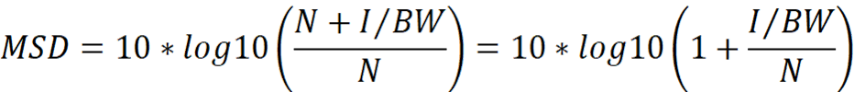
Table 6.2.3-1 PC3 MSD

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n25-n41-n66 | n25 | 1860 | 5 | 25 | 1940 | 11.0 | FDD | IMD4 |
|  | n41 | 2685 | 10 | 50 | 2685 | N/A | TDD | N/A |
|  | n66 | 1715 | 5 | 25 | 2115 | N/A | FDD | N/A |

MSD for PC2 UL CA is calculated from MSD for PC2 as follows:

If the input signal increases by 3 dB, the IMD4 interference power increases by 3\*4=12 dB.

MSD due to interference power is given by



where N is the noise spectral density and BW is the bandwidth of the carrier. If the initial MSD is known,

then we have

Text

Description automatically generated

If is increased by dB, then is given by

A picture containing logo

Description automatically generated





The proposed value for PC2 UL CA MSD can be found in Table 6.x.3-2.

Table 6.x.3-2 PC2 MSD

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n25-n41-n66 | n25 | 1860 | 5 | 25 | 1940 | 22.7 | FDD | IMD4 |
|  | n41 | 2685 | 10 | 50 | 2685 | N/A | TDD | N/A |
|  | n66 | 1715 | 5 | 25 | 2115 | N/A | FDD | N/A |

#### 6.2.3.2 Power class 2 case c

The same MSD applies for Power class 2 case c as power class 2 case a.

### 6.2.4 Void

## 6.3 DL CA\_n25-n41-n71, UL CA\_n25A-n41A

### 6.3.1 Configurations

Table 6.3.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration or  single uplink carrier | NR Band | Channel bandwidth (MHz) | Bandwidth combination set |
| CA\_n25A-n41A-n71A | **CA\_n25A-n41A7**  CA\_n41A-n71A  CA\_n25A-n71A | n25 | n25 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n41 | n41 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n71 | n77 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n25A-n41(2A)-n71A | **CA\_n25A-n41A7**  CA\_n41A-n71A  CA\_n25A-n71A | n25 | n25 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n41 | CA\_n41(2A)\_BCS 4 and 5 |  |
|  |  | n71 | n71 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n25A-n41C-n71A | **CA\_n25A-n41A7**  CA\_n41A-n71A  CA\_n25A-n71A  CA\_n41C | n25 | n25 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n41 | CA\_n41C\_BCS 4 and 5 |  |
|  |  | n71 | n71 channel bandwidths in Table 5.3.5-1 |  |
| NOTE 7: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 9: Power Class 1.5 is allowed for this single uplink carrier in this downlink/uplink combination | | | | |

### 6.3.2 Maximum output power

Table 6.3.2-1 UE Power Class 2 for uplink inter-band CA (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Uplink CA configuration** | **Power class 2 cases for CA\_nX-nY** | **CA power class** | **Carrier X power class** | **Carrier Y power class** |
| CA\_n25A-n41A | Case a | 26dBm | 23dBm | 23dBm |
| Case b | 26dBm | 23dBm | 26dBm |

### 6.3.3 REFSENS requirements

#### 6.3.3.1 Power class 2 case a

Since there is no MSD for PC3 UL CA\_n25A-n41A into n71, none is proposed for PC2.

#### 6.3.3.2 Power class 2 case b

Since there is no MSD for PC3 UL CA\_n25A-n41A into -n71, none is proposed for PC2.

### 6.3.4 Void

## 6.4 DL CA\_n25-n41-n71, UL CA\_n41A-n71A

### 6.4.1 Configurations

Table 6.4.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration or  single uplink carrier | NR Band | Channel bandwidth (MHz) | Bandwidth combination set |
| CA\_n25A-n41A-n71A | CA\_n25A-n41A  **CA\_n41A-n71A7**  CA\_n25A-n71A | n25 | n25 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n41 | n41 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n71 | n77 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n25A-n41(2A)-n71A | CA\_n25A-n41A  **CA\_n41A-n71A7**  CA\_n25A-n71A | n25 | n25 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n41 | CA\_n41(2A)\_BCS 4 and 5 |  |
|  |  | n71 | n71 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n25A-n41C-n71A | CA\_n25A-n41A  **CA\_n41A-n71A7**  CA\_n25A-n71A  CA\_n41C | n25 | n25 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n41 | CA\_n41C\_BCS 4 and 5 |  |
|  |  | n71 | n71 channel bandwidths in Table 5.3.5-1 |  |
| NOTE 7: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 9: Power Class 1.5 is allowed for this single uplink carrier in this downlink/uplink combination | | | | |

### 6.4.2 Maximum output power

Table 6.4.2-1 UE Power Class 2 for uplink inter-band CA (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Uplink CA configuration** | **Power class 2 cases for CA\_nX-nY** | **CA power class** | **Carrier X power class** | **Carrier Y power class** |
| CA\_n41A-n71A | Case a | 26dBm | 23dBm | 23dBm |
| Case c | 26dBm | 26dBm | 23dBm |

### 6.4.3 REFSENS requirements

#### 6.4.3.1 Power class 2 case a

Since there is no MSD for PC3 UL CA\_n41A-n71A into CA\_n25-n41-n71, none is proposed for PC2.

#### 6.4.3.2 Power class 2 case c

Since there is no MSD for PC3 UL CA\_n41A-n71A into CA\_n25-n41-n71, none is proposed for PC2.

### 6.4.4 Void

## 6.5 DL CA\_n25-n41-n71, UL CA\_n41C

### 6.5.1 Configurations

Table 6.5.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration or  single uplink carrier | NR Band | Channel bandwidth (MHz) | Bandwidth combination set |
| CA\_n25A-n41C-n71A | CA\_n25A-n41A  CA\_n41A-n71A  CA\_n25A-n71A  **CA\_n41C7** | n25 | n25 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n41 | CA\_n41C\_BCS 4 and 5 |  |
|  |  | n71 | n71 channel bandwidths in Table 5.3.5-1 |  |
| NOTE 7: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 9: Power Class 1.5 is allowed for this single uplink carrier in this downlink/uplink combination | | | | |

### 6.5.2 Maximum output power

Table 6.5.2-1 UE Power Class 2 for uplink inter-band CA (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Uplink CA configuration** | **Power class 2 cases for CA\_nX-nY** | **CA power class** | **Carrier X power class** | **Carrier Y power class** |
| CA\_n41C | Case a | 26dBm | 23dBm | 23dBm |
| Case b | 26dBm | 23dBm | 26dBm |
| Case c | 26dBm | 26dBm | 23dBm |
| Case d | 26dBm | 26dBm | 26dBm |

### 6.5.3 REFSENS requirements

#### 6.5.3.1 Power class 2 case a, case b, case c, case c

Any MSD for UL CA\_n41C PC2 is handled in the 2 band DL fallbacks.

### 6.5.4 Void

## 6.6 DL CA\_n25-n41-n77, UL CA\_n25A-n41A

### 6.6.1 Configurations

Table 6.6.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration or  single uplink carrier | NR Band | Channel bandwidth (MHz) | Bandwidth combination set |
| CA\_n25A-n41A-n77A | **CA\_n25A-n41A7**  CA\_n25A-n77A  CA\_n41A-n77A | n25 | n25 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n41 | n41 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n77 | n77 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n25(2A)-n41A-n77A | **CA\_n25A-n41A7**  CA\_n25A-n77A  CA\_n41A-n77A | n25 | CA\_n25(2A)\_BCS 4 and 5 | 4 and 5 |
|  |  | n41 | n41 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n77 | n77 channel bandwidths in Table 5.3.5-1 |  |
| NOTE 7: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 9: Power Class 1.5 is allowed for this single uplink carrier in this downlink/uplink combination | | | | |

### 6.6.2 Maximum output power

Table 6.6.2-1 UE Power Class 2 for uplink inter-band CA (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Uplink CA configuration** | **Power class 2 cases for CA\_nX-nY** | **CA power class** | **Carrier X power class** | **Carrier Y power class** |
| CA\_n25A-n41A | Case a | 26dBm | 23dBm | 23dBm |
| Case b | 26dBm | 23dBm | 26dBm |

### 6.6.3 REFSENS requirements

#### 6.6.3.1 Power class 2 case a

Power class 3 CA for UL CA\_n25A-n41A:

Table 6.6.3.1-1 Power class 3 MSD for 2 bands UL CA\_n25A-n41A

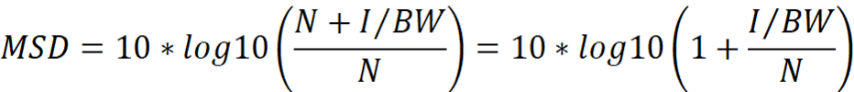
|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n25-n41-n77 | n25 | 1870 | 5 | 25 | 1950 | N/A | FDD | N/A |
|  | n41 | 2670 | 5 | 25 | 2670 | N/A | TDD | N/A |
|  | n77 | 3470 | 10 | 50 | 3470 | 14.8 | TDD | IMD3 |
|  | n25 | 1900 | 5 | 25 | 1980 | N/A | FDD | N/A |
|  | n41 | 2525 | 5 | 25 | 2645 | N/A | TDD | N/A |
|  | n77 | 3775 | 10 | 50 | 3775 | 4.2 | TDD | IMD5 |

MSD for PC2 UL CA is calculated from MSD for PC2 as follows:

If the input signal increases by 3 dB, the IMD3 increases by 3\*3=9 dB.

If the input signal increases by 3 dB, the IMD5 increases by 3\*5=15 dB.

MSD due to interference power is given by



where N is the noise spectral density and BW is the bandwidth of the carrier. If the initial MSD is known,

then we have

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The proposed value for PC2 UL CA MSD can be found in Table 6.6.3.1-1.

Table 6.6.3.1-2 Proposed Power class 2 MSD for UL CA\_n25-n41-n71

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n25-n41-n77 | n25 | 1870 | 5 | 25 | 1950 | N/A | FDD | N/A |
|  | n41 | 2670 | 5 | 25 | 2670 | N/A | TDD | N/A |
|  | n77 | 3470 | 10 | 50 | 3470 | 23.7 | TDD | IMD3 |
|  | n25 | 1900 | 5 | 25 | 1980 | N/A | FDD | N/A |
|  | n41 | 2525 | 5 | 25 | 2645 | N/A | TDD | N/A |
|  | n77 | 3775 | 10 | 50 | 3775 | 17.2 | TDD | IMD5 |

#### 6.6.3.2 Power class 2 case b

The same MSD for case a applies to case b.

### 6.6.4 ∆TIB and ∆RIB values

Void.

## 6.7 DL CA\_n25-n41-n77, UL CA\_n25A-n77A

### 6.7.1 Configurations

Table 6.7.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration or  single uplink carrier | NR Band | Channel bandwidth (MHz) | Bandwidth combination set |
| CA\_n25A-n41A-n77A | CA\_n25A-n41A  **CA\_n25A-n77A7**  CA\_n41A-n77A | n25 | n25 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n41 | n41 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n77 | n77 channel bandwidths in Table 5.3.5-1 |  |
|  | CA\_n25A-n41A  **CA\_n25A-n77A7**  CA\_n41A-n77A | n25 | CA\_n25(2A)\_BCS 4 and 5 | 4 and 5 |
| CA\_n25(2A)-n41A-n77A |  | n41 | n41 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n77 | n77 channel bandwidths in Table 5.3.5-1 |  |
| NOTE 7: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 9: Power Class 1.5 is allowed for this single uplink carrier in this downlink/uplink combination | | | | |

### 6.7.2 Maximum output power

Table 6.7.2-1 UE Power Class 2 for uplink inter-band CA (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Uplink CA configuration** | **Power class 2 cases for CA\_nX-nY** | **CA power class** | **Carrier X power class** | **Carrier Y power class** |
| CA\_n25A-n77A | Case a | 26dBm | 23dBm | 23dBm |
| Case b | 26dBm | 23dBm | 26dBm |

### 6.7.3 REFSENS requirements

#### 6.7.3.1 Power class 2 case a

Power class 3 MSD for UL CA\_n25A-n77A:

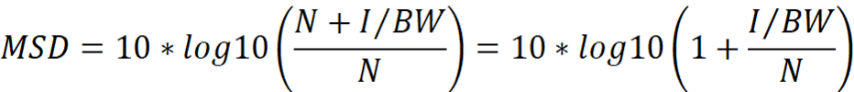
Table 6.7.3.1-1 Power class 3 MSD for 2 bands UL CA\_n25A-n77A

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n25-n41-n77 | n25 | 1870 | 5 | 25 | 1950 | N/A | FDD | N/A |
|  | n41 | 2640 | 5 | 25 | 2640 | 5.3 | TDD | IMD5ZZ |
|  | n77 | 4125 | 10 | 50 | 4125 | N/A | TDD | N/A |
| NOTE 5: For a UE which supports this band combination only when the Band n77 frequency range restriction defined in NOTE 12 of Table 5.2-1 applies, the MSD test point(s) cannot be verified for the band combination and the test point(s) can be skipped. | | | | | | | | |

MSD for PC2 UL CA is calculated from MSD for PC2 as follows:

If the input signal increases by 3 dB, the IMD5 increases by 3\*5=15 dB.

MSD due to interference power is given by



where N is the noise spectral density and BW is the bandwidth of the carrier. If the initial MSD is known,

then we have

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The proposed value for PC2 UL CA MSD can be found in Table 6.7.3.1-2.

Table 6.7.3.1-2 Proposed power class 2 MSD for 2 bands UL CA\_n25A-n77A

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n25-n41-n77 | n25 | 1870 | 5 | 25 | 1950 | N/A | FDD | N/A |
|  | n41 | 2640 | 5 | 25 | 2640 | 18.8 | TDD | IMD55 |
|  | n77 | 4125 | 10 | 50 | 4125 | N/A | TDD | N/A |
| NOTE 5: For a UE which supports this band combination only when the Band n77 frequency range restriction defined in NOTE 12 of Table 5.2-1 applies, the MSD test point(s) cannot be verified for the band combination and the test point(s) can be skipped. | | | | | | | | |

#### 6.7.3.2 Power class 2 case c

The same MSD for case a applies to case b.

### 6.7.4 ∆TIB and ∆RIB values

Void

## 6.8 DL CA\_n25-n41-n77, UL CA\_n41A-n77A

### 6.8.1 Configurations

Table 6.8.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration or  single uplink carrier | NR Band | Channel bandwidth (MHz) | Bandwidth combination set |
| CA\_n25A-n41A-n77A | CA\_n25A-n41A  CA\_n25A-n77A  **CA\_n41A-n77A7** | n25 | n25 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n41 | n41 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n77 | n77 channel bandwidths in Table 5.3.5-1 |  |
|  | CA\_n25A-n41A  CA\_n25A-n77A  **CA\_n41A-n77A7** | n25 | CA\_n25(2A)\_BCS 4 and 5 | 4 and 5 |
| CA\_n25(2A)-n41A-n77A |  | n41 | n41 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n77 | n77 channel bandwidths in Table 5.3.5-1 |  |
| NOTE 7: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 9: Power Class 1.5 is allowed for this single uplink carrier in this downlink/uplink combination | | | | |

### 6.8.2 Maximum output power

Table 6.8.2-1 UE Power Class 2 for uplink inter-band CA (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Uplink CA configuration** | **Power class 2 cases for CA\_nX-nY** | **CA power class** | **Carrier X power class** | **Carrier Y power class** |
| CA\_n41A-n77A | Case a | 26dBm | 23dBm | 23dBm |
| Case b | 26dBm | 23dBm | 26dBm |
| Case c | 26dBm | 26dBm | 23dBm |
| Case d | 26dBm | 26dBm | 26dBm |

### 6.8.3 REFSENS requirements

#### 6.8.3.1 Power class 2 case a, case b, case c, case c

The MSD is the same for case a, case b, case c and case d.

Power class 3 MSD for UL CA\_n41A-n77A:

Table 6.8.3.1-1 Power class 3 MSD for 2 bands UL CA\_n41A-n77A

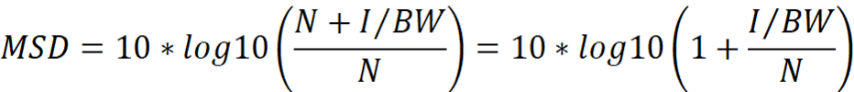
|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n25-n41-n77 | n25 | 1870 | 5 | 25 | 1950 | 17.6 | FDD | IMD3ZZ |
|  | n41 | 2675 | 5 | 25 | 2675 | N/A | TDD | N/A |
|  | n77 | 3400 | 10 | 50 | 3400 | N/A | TDD | N/A |
|  | n25 | 1870 | 5 | 25 | 1950 | 8.6 | FDD | IMD4 |
|  | n41 | 2550 | 5 | 25 | 2685 | N/A | TDD | N/A |
|  | n77 | 3525 | 10 | 50 | 3525 | N/A | TDD | N/A |
| NOTE 5: For a UE which supports this band combination only when the Band n77 frequency range restriction defined in NOTE 12 of Table 5.2-1 applies, the MSD test point(s) cannot be verified for the band combination and the test point(s) can be skipped. | | | | | | | | |

MSD for PC2 UL CA is calculated from MSD for PC2 as follows:

If the input signal increases by 3 dB, the IMD3 increases by 3\*3=9 dB.

If the input signal increases by 3 dB, the IMD4 increases by 3\*4=12 dB.

MSD due to interference power is given by



where N is the noise spectral density and BW is the bandwidth of the carrier. If the initial MSD is known,

then we have

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The proposed value for PC2 UL CA MSD can be found in Table 6.8.3.1-2.

Table 6.8.3.1-1 Proposed power class 2 MSD for 2 bands UL CA\_n41A-n77A

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n25-n41-n77 | n25 | 1870 | 5 | 25 | 1950 | 26.5 | FDD | IMD35 |
|  | n41 | 2675 | 5 | 25 | 2675 | N/A | TDD | N/A |
|  | n77 | 3400 | 10 | 50 | 3400 | N/A | TDD | N/A |
|  | n25 | 1870 | 5 | 25 | 1950 | 20.0 | FDD | IMD4 |
|  | n41 | 2550 | 5 | 25 | 2685 | N/A | TDD | N/A |
|  | n77 | 3525 | 10 | 50 | 3525 | N/A | TDD | N/A |
| NOTE 5: For a UE which supports this band combination only when the Band n77 frequency range restriction defined in NOTE 12 of Table 5.2-1 applies, the MSD test point(s) cannot be verified for the band combination and the test point(s) can be skipped. | | | | | | | | |

### 6.8.4 ∆TIB and ∆RIB values

Void

## 6.9 DL CA\_n25-n66-n77, UL CA\_n25A-n77A

### 6.9.1 Configurations

Table 6.9.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration or  single uplink carrier | NR Band | Channel bandwidth (MHz) | Bandwidth combination set |
| CA\_n25A-n66A-n77A | CA\_n25A-n66A  **CA\_n25A-n77A7**  CA\_n66A-n77A | n25 | n25 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n66 | n66 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n77 | n77 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n25A-n66A-n77(2A) | CA\_n25A-n66A  **CA\_n25A-n77A7**  CA\_n66A-n77A | n25 | n25 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n66 | n66 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n77 | CA\_n77(2A)\_BCS 4 and 5 |  |
| NOTE 7: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 9: Power Class 1.5 is allowed for this single uplink carrier in this downlink/uplink combination | | | | |

### 6.9.2 Maximum output power

Table 6.9.2-1 UE Power Class 2 for uplink inter-band CA (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Uplink CA configuration** | **Power class 2 cases for CA\_nX-nY** | **CA power class** | **Carrier X power class** | **Carrier Y power class** |
| CA\_n25A-n77A | Case a | 26dBm | 23dBm | 23dBm |
| Case b | 26dBm | 23dBm | 26dBm |

### 6.9.3 REFSENS requirements

#### 6.9.3.1 Power class 2 case a

Power class 3 MSD for UL CA\_n25A-n77A:

Table 6.9.3.1-1 Power class 3 MSD for 2 bands UL CA\_n25A-n77A

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n25-n66-n77 | n25 | 1855 | 5 | 25 | 1935 | N/A | FDD | N/A |
|  | n66 | 1715 | 5 | 25 | 2115 | 29.2 | FDD | IMD2 |
|  | n77 | 3970 | 10 | 50 | 3970 | N/A | TDD | N/A |
|  | n25 | 1900 | 5 | 25 | 1980 | N/A | FDD | N/A |
|  | n66 | 1760 | 5 | 25 | 2160 | 10.4 | FDD | IMD4 |
|  | n77 | 3540 | 10 | 50 | 3540 | 10 | TDD | N/A |
|  | n25 | 1900 | 5 | 25 | 1980 | N/A | FDD | N/A |
|  | n66 | 1760 | 5 | 25 | 2160 | 4.0 | FDD | IMD5 |
|  | n77 | 3930 | 10 | 50 | 3930 | N/A | TDD | N/A |

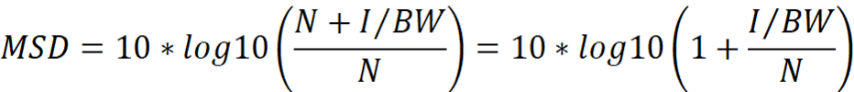
MSD for PC2 UL CA is calculated from MSD for PC2 as follows:

If the input signal increases by 3 dB, the IMD2 increases by 3\*2=6 dB.

If the input signal increases by 3 dB, the IMD5 increases by 3\*4=12 dB.

If the input signal increases by 3 dB, the IMD5 increases by 3\*5=15 dB.

MSD due to interference power is given by



where N is the noise spectral density and BW is the bandwidth of the carrier. If the initial MSD is known,

then we have

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The proposed value for PC2 UL CA MSD can be found in Table 6.9.3.1-2.

Table 6.9.3.1-2 Power class 3 MSD for 2 bands UL CA\_n25A-n77A

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n25-n66-n77 | n25 | 1855 | 5 | 25 | 1935 | N/A | FDD | N/A |
|  | n66 | 1715 | 5 | 25 | 2115 | 35.2 | FDD | IMD2 |
|  | n77 | 3970 | 10 | 50 | 3970 | N/A | TDD | N/A |
|  | n25 | 1900 | 5 | 25 | 1980 | N/A | FDD | N/A |
|  | n66 | 1760 | 5 | 25 | 2160 | 22.0 | FDD | IMD4 |
|  | n77 | 3540 | 10 | 50 | 3540 | N/A | TDD | N/A |
|  | n25 | 1900 | 5 | 25 | 1980 | N/A | FDD | N/A |
|  | n66 | 1760 | 5 | 25 | 2160 | 16.9 | FDD | IMD5 |
|  | n77 | 3930 | 10 | 50 | 3930 | N/A | TDD | N/A |

#### 6.9.3.2 Power class 2 case b

The same MSD for case a applies to case b.

### 6.9.4 ∆TIB and ∆RIB values

Void.

## 6.10 DL CA\_n25-n66-n77, UL CA\_n66A-n77A

### 6.10.1 Configurations

Table 6.10.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration or  single uplink carrier | NR Band | Channel bandwidth (MHz) | Bandwidth combination set |
| CA\_n25A-n66A-n77A | CA\_n25A-n66A  CA\_n25A-n77A  **CA\_n66A-n77A**7 | n25 | n25 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n66 | n66 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n77 | n77 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n25A-n66A-n77(2A) | CA\_n25A-n66A  CA\_n25A-n77A  **CA\_n66A-n77A**7 | n25 | n25 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n66 | n66 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n77 | CA\_n77(2A)\_BCS 4 and 5 |  |
| NOTE 7: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 9: Power Class 1.5 is allowed for this single uplink carrier in this downlink/uplink combination | | | | |

### 6.10.2 Maximum output power

Table 6.10.2-1 UE Power Class 2 for uplink inter-band CA (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Uplink CA configuration** | **Power class 2 cases for CA\_nX-nY** | **CA power class** | **Carrier X power class** | **Carrier Y power class** |
| CA\_n66A-n77A | Case a | 26dBm | 23dBm | 23dBm |
| Case b | 26dBm | 23dBm | 26dBm |

### 6.10.3 REFSENS requirements

#### 6.10.3.1 Power class 2 case a

Power class 3 MSD for UL CA\_n66A-n77A:

Table 6.10.3.1-1 Power class 3 MSD for 2 bands UL CA\_n25A-n77A

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n25-n66-n77 | n25 | 1880 | 5 | 25 | 1960 | 32.1 | FDD | IMD2 |
|  | n66 | 1760 | 5 | 25 | 2160 | N/A | FDD | N/A |
|  | n77 | 3720 | 10 | 50 | 3720 | N/A | TDD | N/A |
|  | n25 | 1880 | 5 | 25 | 1960 | 9.1 | FDD | IMD4ZZ |
|  | n66 | 1770 | 5 | 25 | 2170 | N/A | FDD | N/A |
|  | n77 | 3350 | 10 | 50 | 3350 | N/A | TDD | N/A |
|  | n25 | 1880 | 5 | 25 | 1960 | 2.1 | FDD | IMD5ZZ |
|  | n66 | 1760 | 5 | 25 | 2160 | N/A | FDD | N/A |
|  | n77 | 3620 | 10 | 50 | 3620 | N/A | TDD | N/A |
| NOTE 5: For a UE which supports this band combination only when the Band n77 frequency range restriction defined in NOTE 12 of Table 5.2-1 applies, the MSD test point(s) cannot be verified for the band combination and the test point(s) can be skipped. | | | | | | | | |

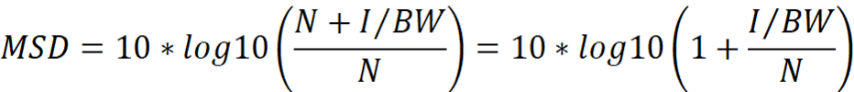
MSD for PC2 UL CA is calculated from MSD for PC2 as follows:

If the input signal increases by 3 dB, the IMD2 increases by 3\*2=6 dB.

If the input signal increases by 3 dB, the IMD5 increases by 3\*4=12 dB.

If the input signal increases by 3 dB, the IMD5 increases by 3\*5=15 dB.

MSD due to interference power is given by



where N is the noise spectral density and BW is the bandwidth of the carrier. If the initial MSD is known,

then we have

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The proposed value for PC2 UL CA MSD can be found in Table 6.10.3.1-2.

Table 6.10.3.1-2 Proposed power class 2 MSD for 2 bands UL CA\_n66A-n77A

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n25-n66-n77 | n25 | 1880 | 5 | 25 | 1960 | 38.1 | FDD | IMD2 |
|  | n66 | 1760 | 5 | 25 | 2160 | N/A | FDD | N/A |
|  | n77 | 3720 | 10 | 50 | 3720 | N/A | TDD | N/A |
|  | n25 | 1880 | 5 | 25 | 1960 | 20.6 | FDD | IMD45 |
|  | n66 | 1770 | 5 | 25 | 2170 | N/A | FDD | N/A |
|  | n77 | 3350 | 10 | 50 | 3350 | N/A | TDD | N/A |
|  | n25 | 1880 | 5 | 25 | 1960 | 13.2 | FDD | IMD55 |
|  | n66 | 1760 | 5 | 25 | 2160 | N/A | FDD | N/A |
|  | n77 | 3620 | 10 | 50 | 3620 | N/A | TDD | N/A |
| NOTE 5: For a UE which supports this band combination only when the Band n77 frequency range restriction defined in NOTE 12 of Table 5.2-1 applies, the MSD test point(s) cannot be verified for the band combination and the test point(s) can be skipped. | | | | | | | | |

#### 6.10.3.2 Power class 2 case c

The same MSD for case a applies to case b.

### 6.10.4 ∆TIB and ∆RIB values

Void

## 6.11 DL CA\_n25-n71-n77, UL CA\_n25A-n77A

### 6.11.1 Configurations

Table 6.11.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration or  single uplink carrier | NR Band | Channel bandwidth (MHz) | Bandwidth combination set |
| CA\_n25A-n71A-n77A | CA\_n25A-n71A  **CA\_n25A-n77A7**  CA\_n71A-n77A | n25 | n25 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n71 | n71 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n77 | n77 channel bandwidths in Table 5.3.5-1 |  |
| NOTE 7: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 9: Power Class 1.5 is allowed for this single uplink carrier in this downlink/uplink combination | | | | |

### 6.11.2 Maximum output power

Table 6.11.2-1 UE Power Class 2 for uplink inter-band CA (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Uplink CA configuration** | **Power class 2 cases for CA\_nX-nY** | **CA power class** | **Carrier X power class** | **Carrier Y power class** |
| CA\_n25A-n77A | Case a | 26dBm | 23dBm | 23dBm |
| Case b | 26dBm | 23dBm | 26dBm |

### 6.11.3 REFSENS requirements

#### 6.11.3.1 Power class 2 case a

There is no MSD for PC3 UL CA\_n25A-n77A, so there should be none for PC2.

#### 6.11.3.2 Power class 2 case b

The same MSD for case a applies to case b.

### 6.11.4 ∆TIB and ∆RIB values

Void.

## 6.12 DL CA\_n25-n71-n77, UL CA\_n71A-n77A

### 6.12.1 Configurations

Table 6.12.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration or  single uplink carrier | NR Band | Channel bandwidth (MHz) | Bandwidth combination set |
| CA\_n25A-n71A-n77A | CA\_n25A-n71A  CA\_n25A-n77A  **CA\_n71A-n77A7** | n25 | n25 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n71 | n71 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n77 | n77 channel bandwidths in Table 5.3.5-1 |  |
| NOTE 7: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 9: Power Class 1.5 is allowed for this single uplink carrier in this downlink/uplink combination | | | | |

### 6.12.2 Maximum output power

Table 6.12.2-1 UE Power Class 2 for uplink inter-band CA (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Uplink CA configuration** | **Power class 2 cases for CA\_nX-nY** | **CA power class** | **Carrier X power class** | **Carrier Y power class** |
| CA\_n71A-n77A | Case a | 26dBm | 23dBm | 23dBm |
| Case b | 26dBm | 23dBm | 26dBm |

### 6.12.3 REFSENS requirements

#### 6.12.3.1 Power class 2 case a

Power class 3 MSD for UL CA\_n71A-n77A:

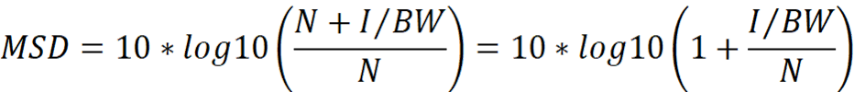
Table 6.12.3.1-1 Power class 3 MSD for 2 bands UL CA\_n71A-n77A

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n25-n71-n77 | n25 | 1874 | 5 | 25 | 1954 | 16.5 | FDD | IMD32,5 |
|  | n71 | 693 | 5 | 25 | 647 | N/A | FDD | N/A |
|  | n77 | 3340 | 10 | 50 | 3340 | N/A | TDD | N/A |
| NOTE 2: This band is subject to IMD4 also which MSD is not specified.  NOTE 5: For a UE which supports this band combination only when the Band n77 frequency range restriction defined in NOTE 12 of Table 5.2-1 applies, the MSD test point(s) cannot be verified for the band combination and the test point(s) can be skipped. | | | | | | | | |

MSD for PC2 UL CA is calculated from MSD for PC2 as follows:

If the input signal increases by 3 dB, the IMD3 increases by 3\*3=9 dB.

MSD due to interference power is given by



where N is the noise spectral density and BW is the bandwidth of the carrier. If the initial MSD is known,

then we have

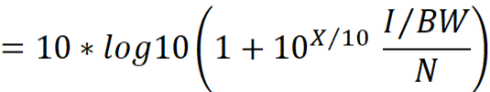
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The proposed value for PC2 UL CA MSD can be found in Table 6.12.3.1-2.

Table 6.12.3.1-2 Proposed power class 2 MSD for 2 bands UL CA\_n71A-n77A

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n25-n71-n77 | n25 | 1874 | 5 | 25 | 1954 | 25.4 | FDD | IMD32,5 |
|  | n71 | 693 | 5 | 25 | 647 | N/A | FDD | N/A |
|  | n77 | 3340 | 10 | 50 | 3340 | N/A | TDD | N/A |
| NOTE 2: This band is subject to IMD4 also which MSD is not specified.  NOTE 5: For a UE which supports this band combination only when the Band n77 frequency range restriction defined in NOTE 12 of Table 5.2-1 applies, the MSD test point(s) cannot be verified for the band combination and the test point(s) can be skipped. | | | | | | | | |

#### 6.12.3.2 Power class 2 case c

The same MSD for case a applies to case b.

### 6.12.4 ∆TIB and ∆RIB values

Void

## 6.13 DL CA\_n41-n66-n77, UL CA\_n41A-n66A

### 6.13.1 Configurations

*<Editor’s note: the CA configurations and bandwidth combinations sets should be kept same as defined in 38.101-1 Table 5.5A.3.2-1x unless additional clarification>*

Table 6.13.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration or  single uplink carrier | NR Band | Channel bandwidth (MHz) | Bandwidth combination set |
| CA\_n41A-n66A-n77A | **CA\_n41A-n66A7**  CA\_n41A-n77A  CA\_n66A-n77A | n41 | n41 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n66 | n66 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n77 | n77 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n41A-n66(2A)-n77A | **CA\_n41A-n66A**7  CA\_n41A-n77A  CA\_n66A-n77A | n41 | n41 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n66 | CA\_n66(2A)\_BCS 4 and 5 |  |
|  |  | n77 | n77 channel bandwidths in Table 5.3.5-1 |  |
| NOTE 7: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 9: Power Class 1.5 is allowed for this single uplink carrier in this downlink/uplink combination | | | | |

### 6.13.2 Maximum output power

*<Editor’s note: In table 6.13.2-1, the power class 2 cases supported by the uplink CA should be kept as the same numbering and others that not supported should be removed. >*

Table 6.13.2-1 UE Power Class 2 for uplink inter-band CA (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Uplink CA configuration** | **Power class 2 cases for CA\_nX-nY** | **CA power class** | **Carrier X power class** | **Carrier Y power class** |
| CA\_n41A-n66A | Case a | 26dBm | 23dBm | 23dBm |
| Case c | 26dBm | 26dBm | 23dBm |

### 6.13.3 REFSENS requirements

#### 6.13.3.1 Power class 2 case a

Power class 3 CA for UL CA\_n25A-n41A:

Table 6.13.3.1-1 Power class 3 MSD for 2 bands UL CA\_n41A-n66A

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n41-n66-n77 | n41 | 2600 | 5 | 25 | 2600 | N/A | TDD | N/A |
|  | n66 | 1730 | 5 | 25 | 2130 | N/A | FDD | N/A |
|  | n77 | 3470 | 10 | 50 | 3470 | 16.1 | TDD | IMD31,2 |
| NOTE 1: This band is subject to IMD5 also which MSD is not specified.  NOTE 2: This band is subject to IMD4 also which MSD is not specified. | | | | | | | | |

MSD for PC2 UL CA is calculated from MSD for PC2 as follows:

If the input signal increases by 3 dB, the IMD3 increases by 3\*3=9 dB.

MSD due to interference power is given by



where N is the noise spectral density and BW is the bandwidth of the carrier. If the initial MSD is known,

then we have

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The proposed value for PC2 UL CA MSD can be found in Table 6.13.3.1-1.

Table 6.13.3.1-2 Proposed Power class 2 MSD for UL CA\_n41-n66

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n41-n66-n77 | n41 | 2600 | 5 | 25 | 2600 | N/A | TDD | N/A |
|  | n66 | 1730 | 5 | 25 | 2130 | N/A | FDD | N/A |
|  | n77 | 3470 | 10 | 50 | 3470 | 25.0 | TDD | IMD31,2 |
| NOTE 1: This band is subject to IMD5 also which MSD is not specified.  NOTE 2: This band is subject to IMD4 also which MSD is not specified. | | | | | | | | |

#### 6.13.3.2 Power class 2 case b

The same MSD for case a applies to casec.

### 6.13.4 ∆TIB and ∆RIB values

Void.

## 6.14 DL CA\_n41-n66-n77, UL CA\_n41A-n77A

### 6.14.1 Configurations

Table 6.14.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration or  single uplink carrier | NR Band | Channel bandwidth (MHz) | Bandwidth combination set |
| CA\_n41A-n66A-n77A | CA\_n41A-n66A  **CA\_n41A-n77A7**  CA\_n66A-n77A | n41 | n41 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n66 | n66 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n77 | n77 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n41A-n66(2A)-n77A | CA\_n41A-n66A  **CA\_n41A-n77A7**  CA\_n66A-n77A | n41 | n41 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n66 | CA\_n66(2A)\_BCS 4 and 5 |  |
|  |  | n77 | n77 channel bandwidths in Table 5.3.5-1 |  |
| NOTE 7: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 9: Power Class 1.5 is allowed for this single uplink carrier in this downlink/uplink combination | | | | |

### 6.14.2 Maximum output power

Table 6.14.2-1 UE Power Class 2 for uplink inter-band CA (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Uplink CA configuration** | **Power class 2 cases for CA\_nX-nY** | **CA power class** | **Carrier X power class** | **Carrier Y power class** |
| CA\_n41A-n77A | Case a | 26dBm | 23dBm | 23dBm |
| Case b | 26dBm | 23dBm | 26dBm |
| Case c | 26dBm | 26dBm | 23dBm |
| Case d | 26dBm | 26dBm | 26dBm |

### 6.14.3 REFSENS requirements

*<Editor’s note: This agenda will capture the Reference sensitivity exceptions or MSD requirements due to higher power for CA carrier, please use the same table format as in 38101-1. The requirements in this TR are intended to be power class 2 cases based, however how to address in the spec will be further discussed. >*

#### 6.14.3.1 Power class 2 case a, case b, case c, case d

Power class 3 MSD for UL CA\_n41A-n77A:

Table 6.14.3.1-1 Power class 3 MSD for 2 bands UL CA\_n41A-n77A

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n41-n66-n77 | n41 | 2640 | 5 | 25 | 2640 | N/A | TDD | N/A |
|  | n66 | 1760 | 5 | 25 | 2160 | 9.0 | FDD | IMD4 |
|  | n77 | 3720 | 10 | 50 | 3720 | N/A | TDD | N/A |

MSD for PC2 UL CA is calculated from MSD for PC2 as follows:

If the input signal increases by 3 dB, the IMD4 increases by 3\*4=12 dB.

MSD due to interference power is given by



where N is the noise spectral density and BW is the bandwidth of the carrier. If the initial MSD is known,

then we have

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The proposed value for PC2 UL CA MSD can be found in Table 6.14.3.1-2.

Table 6.14.3.1-2 Proposed power class 2 MSD for 2 bands UL CA\_41A-n77A

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n41-n66-n77 | n41 | 2640 | 5 | 25 | 2640 | N/A | TDD | N/A |
|  | n66 | 1760 | 5 | 25 | 2160 | 20.5 | FDD | IMD4 |
|  | n77 | 3720 | 10 | 50 | 3720 | N/A | TDD | N/A |

### 6.14.4 ∆TIB and ∆RIB values

Void

## 6.15 DL CA\_n41-n66-n77, UL CA\_n66A-n77A

### 6.15.1 Configurations

Table 6.15.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration or  single uplink carrier | NR Band | Channel bandwidth (MHz) | Bandwidth combination set |
| CA\_n41A-n66A-n77A | CA\_n41A-n66A  CA\_n41A-n77A  **CA\_n66A-n77A**7 | n41 | n41 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n66 | n66 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n77 | n77 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n41A-n66(2A)-n77A | CA\_n41A-n66A  CA\_n41A-n77A  **CA\_n66A-n77A**7 | n41 | n41 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n66 | CA\_n66(2A)\_BCS 4 and 5 |  |
|  |  | n77 | n77 channel bandwidths in Table 5.3.5-1 |  |
| NOTE 7: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 9: Power Class 1.5 is allowed for this single uplink carrier in this downlink/uplink combination | | | | |

### 6.15.2 Maximum output power

Table 6.15.2-1 UE Power Class 2 for uplink inter-band CA (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Uplink CA configuration** | **Power class 2 cases for CA\_nX-nY** | **CA power class** | **Carrier X power class** | **Carrier Y power class** |
| CA\_n41A-n77A | Case a | 26dBm | 23dBm | 23dBm |
| Case b | 26dBm | 23dBm | 26dBm |

### 6.15.3 REFSENS requirements

#### 6.15.3.1 Power class 2 case a, case b, case c, case c

The MSD is the same for case a, case b, case c and case d.

Power class 3 MSD for UL CA\_n66A-n77A:

Table 6.15.3.1-1 Power class 3 MSD for 2 bands UL CA\_n66A-n77A

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n41-n66-n77 | n41 | 2670 | 5 | 25 | 2670 | 5.2 | TDD | IMD55 |
|  | n66 | 1715 | 5 | 25 | 2115 | N/A | FDD | N/A |
|  | n77 | 4190 | 10 | 50 | 4190 | N/A | TDD | N/A |
| NOTE 5: For a UE which supports this band combination only when the Band n77 frequency range restriction defined in NOTE 12 of Table 5.2-1 applies, the MSD test point(s) cannot be verified for the band combination and the test point(s) can be skipped. | | | | | | | | |

MSD for PC2 UL CA is calculated from MSD for PC2 as follows:

If the input signal increases by 3 dB, the IMD3 increases by 3\*5=15 dB.

MSD due to interference power is given by



where N is the noise spectral density and BW is the bandwidth of the carrier. If the initial MSD is known,

then we have

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The proposed value for PC2 UL CA MSD can be found in Table 6.15.3.1-2.

Table 6.15.3.1-1 Proposed power class 2 MSD for 2 bands UL CA\_n66A-n77A

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n41-n66-n77 | n41 | 2670 | 5 | 25 | 2670 | 18.7 | TDD | IMD55 |
|  | n66 | 1715 | 5 | 25 | 2115 | N/A | FDD | N/A |
|  | n77 | 4190 | 10 | 50 | 4190 | N/A | TDD | N/A |
| NOTE 5: For a UE which supports this band combination only when the Band n77 frequency range restriction defined in NOTE 12 of Table 5.2-1 applies, the MSD test point(s) cannot be verified for the band combination and the test point(s) can be skipped. | | | | | | | | |

### 6.15.4 ∆TIB and ∆RIB values

Void

## 6.16 DL CA\_n41-n71-n77, UL CA\_n41A-n71A

### 6.16.1 Configurations

Table 6.16.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration or  single uplink carrier | NR Band | Channel bandwidth (MHz) | Bandwidth combination set |
| CA\_n41A-n71A-n77A | **CA\_n41A-n71A7**  CA\_n41A-n77A  CA\_n71A-n77A | n41 | n41 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n71 | n71 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n77 | n77 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n41A-n71B-n77A | **CA\_n41A-n71A7**  CA\_n41A-n77A  CA\_n71A-n77A | n41 | n41 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n71 | CA\_n71B\_BCS 4 and 5 |  |
|  |  | n77 | n77 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n41A-n71(2A)-n77A | **CA\_n41A-n71A7**  CA\_n41A-n77A  CA\_n71A-n77A | n41 | n41 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n71 | CA\_n71(2A)\_BCS 4 and 5 |  |
|  |  | n77 | n77 channel bandwidths in Table 5.3.5-1 |  |
| NOTE 7: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 9: Power Class 1.5 is allowed for this single uplink carrier in this downlink/uplink combination | | | | |

### 6.16.2 Maximum output power

Table 6.16.2-1 UE Power Class 2 for uplink inter-band CA (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Uplink CA configuration** | **Power class 2 cases for CA\_nX-nY** | **CA power class** | **Carrier X power class** | **Carrier Y power class** |
| CA\_n41A-n71A | Case a | 26dBm | 23dBm | 23dBm |
| Case c | 26dBm | 26dBm | 23dBm |

### 6.16.3 REFSENS requirements

#### 6.16.3.1 Power class 2 case a

Power class 3 CA for UL CA\_n41A-n71A:

Table 6.16.3.1-1 Power class 3 MSD for 2 bands UL CA\_n41A-n71A

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n41-n71-n77 | n41 | 2615 | 5 | 25 | 2615 | N/A | TDD | N/A |
|  | n71 | 693 | 5 | 25 | 647 | N/A | FDD | N/A |
|  | n77 | 3308 | 10 | 50 | 3308 | 29.1 | TDD | IMD21,5 |
|  | n41 | 2564 | 5 | 25 | 2564 | N/A | TDD | N/A |
|  | n71 | 693 | 5 | 25 | 647 | N/A | FDD | N/A |
|  | n77 | 3950 | 10 | 50 | 3950 | 16.3 | TDD | IMD31 |
|  | n41 | 2580 | 5 | 25 | 2580 | N/A | TDD | N/A |
|  | n71 | 693 | 5 | 25 | 647 | N/A | FDD | N/A |
|  | n77 | 3774 | 10 | 50 | 3774 | 10.3 | TDD | IMD41 |
| NOTE 1: This band is subject to IMD5 also which MSD is not specified.  NOTE 5: For a UE which supports this band combination only when the Band n77 frequency range restriction defined in NOTE 12 of Table 5.2-1 applies, the MSD test point(s) cannot be verified for the band combination and the test point(s) can be skipped. | | | | | | | | |

MSD for PC2 UL CA is calculated from MSD for PC2 as follows:

If the input signal increases by 3 dB, the IMD2 increases by 3\*2=6 dB.

If the input signal increases by 3 dB, the IMD3 increases by 3\*3=9 dB.

If the input signal increases by 3 dB, the IMD4 increases by 3\*4=12 dB.

MSD due to interference power is given by



where N is the noise spectral density and BW is the bandwidth of the carrier. If the initial MSD is known,

then we have

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The proposed value for PC2 UL CA MSD can be found in Table 6.16.3.1-1.

Table 6.16.3.1-2 Proposed Power class 2 MSD for UL CA\_n41-n71

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n41-n71-n77 | n41 | 2615 | 5 | 25 | 2615 | N/A | TDD | N/A |
|  | n71 | 693 | 5 | 25 | 647 | N/A | FDD | N/A |
|  | n77 | 3308 | 10 | 50 | 3308 | 35.1 | TDD | IMD21,5 |
|  | n41 | 2564 | 5 | 25 | 2564 | N/A | TDD | N/A |
|  | n71 | 693 | 5 | 25 | 647 | N/A | FDD | N/A |
|  | n77 | 3950 | 10 | 50 | 3950 | 25.2 | TDD | IMD31 |
|  | n41 | 2580 | 5 | 25 | 2580 | N/A | TDD | N/A |
|  | n71 | 693 | 5 | 25 | 647 | N/A | FDD | N/A |
|  | n77 | 3774 | 10 | 50 | 3774 | 21.9 | TDD | IMD41 |
| NOTE 1: This band is subject to IMD5 also which MSD is not specified.  NOTE 5: For a UE which supports this band combination only when the Band n77 frequency range restriction defined in NOTE 12 of Table 5.2-1 applies, the MSD test point(s) cannot be verified for the band combination and the test point(s) can be skipped. | | | | | | | | |

#### 6.16.3.2 Power class 2 case c

The same MSD for case a applies to case c.

### 6.16.4 ∆TIB and ∆RIB values

Void.

## 6.17 DL CA\_n41-n71-n77, UL CA\_n41A-n77A

### 6.17.1 Configurations

Table 6.17.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration or  single uplink carrier | NR Band | Channel bandwidth (MHz) | Bandwidth combination set |
| CA\_n41A-n71A-n77A | CA\_n41A-n71A  **CA\_n41A-n77A7**  CA\_n71A-n77A | n41 | n41 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n71 | n71 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n77 | n77 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n41A-n71B-n77A | CA\_n41A-n71A  **CA\_n41A-n77A7**  CA\_n71A-n77A | n41 | n41 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n71 | CA\_n71B\_BCS 4 and 5 |  |
|  |  | n77 | n77 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n41A-n71(2A)-n77A | CA\_n41A-n71A  **CA\_n41A-n77A7**  CA\_n71A-n77A | n41 | n41 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n71 | CA\_n71(2A)\_BCS 4 and 5 |  |
|  |  | n77 | n77 channel bandwidths in Table 5.3.5-1 |  |
| NOTE 7: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 9: Power Class 1.5 is allowed for this single uplink carrier in this downlink/uplink combination | | | | |

### 6.17.2 Maximum output power

Table 6.17.2-1 UE Power Class 2 for uplink inter-band CA (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Uplink CA configuration** | **Power class 2 cases for CA\_nX-nY** | **CA power class** | **Carrier X power class** | **Carrier Y power class** |
| CA\_n41A-n77A | Case a | 26dBm | 23dBm | 23dBm |
| Case b | 26dBm | 23dBm | 26dBm |
| Case c | 26dBm | 26dBm | 23dBm |
| Case d | 26dBm | 26dBm | 26dBm |

### 6.17.3 REFSENS requirements

#### 6.17.3.1 Power class 2 case a, case b, case c, case d

Power class 3 MSD for UL CA\_n41A-n77A:

Table 6.17.3.1-1 Power class 3 MSD for 2 bands UL CA\_n41A-n77A

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n41-n71-n77 | 41 | 2680 | 5 | 25 | 2680 | N/A | TDD | N/A |
|  | n71 | 686 | 5 | 25 | 640 | 30.8 | FDD | IMD25 |
|  | n77 | 3320 | 10 | 50 | 3320 | N/A | TDD | N/A |
| NOTE 5: For a UE which supports this band combination only when the Band n77 frequency range restriction defined in NOTE 12 of Table 5.2-1 applies, the MSD test point(s) cannot be verified for the band combination and the test point(s) can be skipped. | | | | | | | | |

MSD for PC2 UL CA is calculated from MSD for PC2 as follows:

If the input signal increases by 3 dB, the IMD2 increases by 3\*2=6 dB.

MSD due to interference power is given by



where N is the noise spectral density and BW is the bandwidth of the carrier. If the initial MSD is known,

then we have

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The proposed value for PC2 UL CA MSD can be found in Table 6.17.3.1-2.

Table 6.17.3.1-2 Proposed power class 2 MSD for 2 bands UL CA\_41A-n77A

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n41-n71-n77 | 41 | 2680 | 5 | 25 | 2680 | N/A | TDD | N/A |
|  | n71 | 686 | 5 | 25 | 640 | 36.8 | FDD | IMD25 |
|  | n77 | 3320 | 10 | 50 | 3320 | N/A | TDD | N/A |
| NOTE 5: For a UE which supports this band combination only when the Band n77 frequency range restriction defined in NOTE 12 of Table 5.2-1 applies, the MSD test point(s) cannot be verified for the band combination and the test point(s) can be skipped. | | | | | | | | |

### 6.17.4 ∆TIB and ∆RIB values

Void

## 6.18 DL CA\_n41-n71-n77, UL CA\_n71A-n77A

### 6.18.1 Configurations

Table 6.18.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration or  single uplink carrier | NR Band | Channel bandwidth (MHz) | Bandwidth combination set |
| CA\_n41A-n71A-n77A | CA\_n41A-n71A  CA\_n41A-n77A  **CA\_n71A-n77A7** | n41 | n41 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n71 | n71 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n77 | n77 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n41A-n71B-n77A | CA\_n41A-n71A  CA\_n41A-n77A  **CA\_n71A-n77A7** | n41 | n41 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n71 | CA\_n71B\_BCS 4 and 5 |  |
|  |  | n77 | n77 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n41A-n71(2A)-n77A | CA\_n41A-n71A  CA\_n41A-n77A  **CA\_n71A-n77A7** | n41 | n41 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n71 | CA\_n71(2A)\_BCS 4 and 5 |  |
|  |  | n77 | n77 channel bandwidths in Table 5.3.5-1 |  |
| NOTE 7: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 9: Power Class 1.5 is allowed for this single uplink carrier in this downlink/uplink combination | | | | |

### 6.18.2 Maximum output power

Table 6.18.2-1 UE Power Class 2 for uplink inter-band CA (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Uplink CA configuration** | **Power class 2 cases for CA\_nX-nY** | **CA power class** | **Carrier X power class** | **Carrier Y power class** |
| CA\_n71A-n77A | Case a | 26dBm | 23dBm | 23dBm |
| Case b | 26dBm | 23dBm | 26dBm |

### 6.18.3 REFSENS requirements

#### 6.18.3.1 Power class 2 case a, case b, case c, case c

The MSD is the same for case a, case b, case c and case d.

Power class 3 MSD for UL CA\_n71A-n77A:

Table 6.18.3.1-1 Power class 3 MSD for 2 bands UL CA\_n71A-n77A

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n41-n71-n77 | n41 | 2615 | 5 | 25 | 2615 | 28.7 | TDD | IMD25 |
|  | n71 | 693 | 5 | 25 | 647 | N/A | FDD | N/A |
|  | n77 | 3308 | 10 | 50 | 3308 | N/A | TDD | N/A |
|  | n41 | 2564 | 5 | 25 | 2564 | 15.5 | TDD | IMD3 |
|  | n71 | 693 | 5 | 25 | 647 | N/A | FDD | N/A |
|  | n77 | 3950 | 10 | 50 | 3950 | N/A | TDD | N/A |
| NOTE 5: For a UE which supports this band combination only when the Band n77 frequency range restriction defined in NOTE 12 of Table 5.2-1 applies, the MSD test point(s) cannot be verified for the band combination and the test point(s) can be skipped. | | | | | | | | |

MSD for PC2 UL CA is calculated from MSD for PC2 as follows:

If the input signal increases by 3 dB, the IMD2 increases by 3\*2=6 dB.

If the input signal increases by 3 dB, the IMD3 increases by 3\*3=9 dB.

MSD due to interference power is given by



where N is the noise spectral density and BW is the bandwidth of the carrier. If the initial MSD is known,

then we have

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The proposed value for PC2 UL CA MSD can be found in Table 6.18.3.1-2.

Table 6.18.3.1-1 Proposed power class 2 MSD for 2 bands UL CA\_n71A-n77A

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n41-n71-n77 | n41 | 2615 | 5 | 25 | 2615 | 34.7 | TDD | IMD25 |
|  | n71 | 693 | 5 | 25 | 647 | N/A | FDD | N/A |
|  | n77 | 3308 | 10 | 50 | 3308 | N/A | TDD | N/A |
|  | n41 | 2564 | 5 | 25 | 2564 | 24.4 | TDD | IMD3 |
|  | n71 | 693 | 5 | 25 | 647 | N/A | FDD | N/A |
|  | n77 | 3950 | 10 | 50 | 3950 | N/A | TDD | N/A |
| NOTE 5: For a UE which supports this band combination only when the Band n77 frequency range restriction defined in NOTE 12 of Table 5.2-1 applies, the MSD test point(s) cannot be verified for the band combination and the test point(s) can be skipped. | | | | | | | | |

### 6.18.4 ∆TIB and ∆RIB values

Void

## 6.19 DL CA\_n66-n71-n77, UL CA\_n66A-n77A

### 6.19.1 Configurations

Table 6.19.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration or  single uplink carrier | NR Band | Channel bandwidth (MHz) | Bandwidth combination set |
| CA\_n66A-n71A-n77A | CA\_n66A-n71A  **CA\_n66A-n77A7**  CA\_n71A-n77A | n66 | n66 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n71 | n71 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n77 | n77 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n66A-n71A-n77(2A) | CA\_n66A-n71A  **CA\_n66A-n77A7**  CA\_n71A-n77A | n66 | n66 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n71 | n71 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n77 | CA\_n77(2A)\_BCS 4 and 5 |  |
| NOTE 7: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 9: Power Class 1.5 is allowed for this single uplink carrier in this downlink/uplink combination | | | | |

### 6.19.2 Maximum output power

Table 6.19.2-1 UE Power Class 2 for uplink inter-band CA (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Uplink CA configuration** | **Power class 2 cases for CA\_nX-nY** | **CA power class** | **Carrier X power class** | **Carrier Y power class** |
| CA\_n66A-n77A | Case a | 26dBm | 23dBm | 23dBm |
| Case b | 26dBm | 23dBm | 26dBm |

### 6.19.3 REFSENS requirements

#### 6.19.3.1 Power class 2 case a

Power class 3 MSD for UL CA\_n66A-n77A:

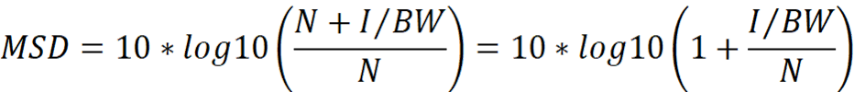
Table 6.19.3.1-1 Power class 3 MSD for 2 bands UL CA\_n66A-n77A

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n66-n71-n77 | n66 | 1720 | 5 | 25 | 2120 | N/A | FDD | N/A |
|  | n71 | 686 | 5 | 25 | 640 | 15.3 | FDD | IMD35 |
|  | n77 | 4080 | 10 | 50 | 4080 | N/A | TDD | N/A |
| NOTE 5: For a UE which supports this band combination only when the Band n77 frequency range restriction defined in NOTE 12 of Table 5.2-1 applies, the MSD test point(s) cannot be verified for the band combination and the test point(s) can be skipped. | | | | | | | | |

MSD for PC2 UL CA is calculated from MSD for PC2 as follows:

If the input signal increases by 3 dB, the IMD3 increases by 3\*3=9 dB.

MSD due to interference power is given by



where N is the noise spectral density and BW is the bandwidth of the carrier. If the initial MSD is known,

then we have

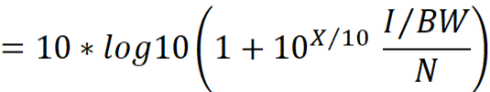
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The proposed value for PC2 UL CA MSD can be found in Table 6.19.3.1-2.

Table 6.19.3.1-2 Proposed power class 2 MSD for 2 bands UL CA\_n66A-n77A

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n66-n71-n77 | n66 | 1720 | 5 | 25 | 2120 | N/A | FDD | N/A |
|  | n71 | 686 | 5 | 25 | 640 | 24.2 | FDD | IMD35 |
|  | n77 | 4080 | 10 | 50 | 4080 | N/A | TDD | N/A |
| NOTE 5: For a UE which supports this band combination only when the Band n77 frequency range restriction defined in NOTE 12 of Table 5.2-1 applies, the MSD test point(s) cannot be verified for the band combination and the test point(s) can be skipped. | | | | | | | | |

#### 6.19.3.2 Power class 2 case b

The same MSD for case a applies to case b.

### 6.19.4 ∆TIB and ∆RIB values

Void.

## 6.20 DL CA\_n66-n71-n77, UL CA\_n71A-n77A

### 6.20.1 Configurations

Table 6.20.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration or  single uplink carrier | NR Band | Channel bandwidth (MHz) | Bandwidth combination set |
| CA\_n66A-n71A-n77A | CA\_n66A-n71A  CA\_n66A-n77A  **CA\_n71A-n77A7** | n66 | n66 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n71 | n71 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n77 | n77 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n66A-n71A-n77(2A) | CA\_n66A-n71A  CA\_n66A-n77A  **CA\_n71A-n77A**7 | n66 | n66 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n71 | n71 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n77 | CA\_n77(2A)\_BCS 4 and 5 |  |
| NOTE 7: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 9: Power Class 1.5 is allowed for this single uplink carrier in this downlink/uplink combination | | | | |

### 6.20.2 Maximum output power

Table 6.20.2-1 UE Power Class 2 for uplink inter-band CA (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Uplink CA configuration** | **Power class 2 cases for CA\_nX-nY** | **CA power class** | **Carrier X power class** | **Carrier Y power class** |
| CA\_n71A-n77A | Case a | 26dBm | 23dBm | 23dBm |
| Case b | 26dBm | 23dBm | 26dBm |

### 6.20.3 REFSENS requirements

#### 6.20.3.1 Power class 2 case a

Power class 3 MSD for UL CA\_n71A-n77A:

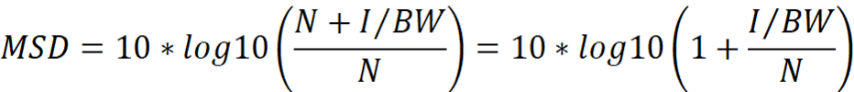
Table 6.20.3.1-1 Power class 3 MSD for 2 bands UL CA\_n71A-n77A

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n66-n71-n77 | n66 | 1750 | 5 | 25 | 2150 | 15.5 | FDD | IMD32 |
|  | n71 | 690 | 5 | 25 | 644 | N/A | FDD | N/A |
|  | n77 | 3530 | 10 | 50 | 3530 | N/A | TDD | N/A |
| NOTE 2: This band is subject to IMD4 also which MSD is not specified. | | | | | | | | |

MSD for PC2 UL CA is calculated from MSD for PC2 as follows:

If the input signal increases by 3 dB, the IMD3 increases by 3\*3=9 dB.

MSD due to interference power is given by



where N is the noise spectral density and BW is the bandwidth of the carrier. If the initial MSD is known,

then we have

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The proposed value for PC2 UL CA MSD can be found in Table 6.20.3.1-2.

Table 6.20.3.1-2 Proposed power class 2 MSD for 2 bands UL CA\_n71A-n77A

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CA\_n66-n71-n77 | n66 | 1750 | 5 | 25 | 2150 | 24.4 | FDD | IMD32 |
|  | n71 | 690 | 5 | 25 | 644 | N/A | FDD | N/A |
|  | n77 | 3530 | 10 | 50 | 3530 | N/A | TDD | N/A |
| NOTE 2: This band is subject to IMD4 also which MSD is not specified. | | | | | | | | |

#### 6.20.3.2 Power class 2 case c

The same MSD for case a applies to case b.

### 6.20.4 ∆TIB and ∆RIB values

Void

## 6.21 DL CA\_n41-n66-n71, UL CA\_n41A-n71A

### 6.21.1 Configurations

Table 6.21.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration or  single uplink carrier | NR Band | Channel bandwidth (MHz) | Bandwidth combination set |
| CA\_n41A-n66A-n71A | CA\_n41A-n71A7  CA\_n66A-n71A  CA\_n41A-n66A | n41 | n41 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n66 | n66 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n71 | n77 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n41C-n66A-n71A | CA\_n41A-n71A7  CA\_n66A-n71A  CA\_n41A-n66A | n41 | CA\_n41C\_BCS 4 and 5 | 4 and 5 |
|  |  | n66 | n66 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n71 | n71 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n41(2A)-n66A-n71A | CA\_n41A-n71A7  CA\_n66A-n71A  CA\_n41A-n66A | n41 | CA\_n41(2A)\_BCS 4 and 5 | 4 and 5 |
|  |  | n66 | n66 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n71 | n71 channel bandwidths in Table 5.3.5-1 |  |
| NOTE 7: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 9: Power Class 1.5 is allowed for this single uplink carrier in this downlink/uplink combination | | | | |

### 6.21.2 Maximum output power

Table 6.21.2-1 UE Power Class 2 for uplink inter-band CA (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Uplink CA configuration** | **Power class 2 cases for CA\_nX-nY** | **CA power class** | **Carrier X power class** | **Carrier Y power class** |
| CA\_n41A-n71A | Case a | 26dBm | 23dBm | 23dBm |
| Case c | 26dBm | 26dBm | 23dBm |

### 6.21.3 REFSENS requirements

#### 6.21.3.1 Power class 2 case a

Since there is no MSD for PC3 UL CA\_n41A-n71A into CA\_n41-n66-n71, none is proposed for PC2.

#### 6.21.3.2 Power class 2 case c

Since there is no MSD for PC3 UL CA\_n41A-n71A into CA\_n41-n66-n71, none is proposed for PC2.

### 6.21.4 Void

## 6.22 DL CA\_n25-n41-n71, UL CA\_n41A-n71A

### 6.22.1 Configurations

Table 6.22.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (three bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration or  single uplink carrier | NR Band | Channel bandwidth (MHz) | Bandwidth combination set |
| CA\_n41A-n66A-n71A | CA\_n41A-n71A  CA\_n66A-n71A  CA\_n41A-n66A7 | n41 | n41 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n66 | n66 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n71 | n77 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n41C-n66A-n71A | CA\_n41A-n71A  CA\_n66A-n71A  CA\_n41A-n66A7 | n41 | CA\_n41C\_BCS 4 and 5 | 4 and 5 |
|  |  | n66 | n66 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n71 | n71 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n41(2A)-n66A-n71A | CA\_n41A-n71A  CA\_n66A-n71A  CA\_n41A-n66A7 | n41 | CA\_n41(2A)\_BCS 4 and 5 | 4 and 5 |
|  |  | n66 | n66 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n71 | n71 channel bandwidths in Table 5.3.5-1 |  |
| NOTE 7: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 9: Power Class 1.5 is allowed for this single uplink carrier in this downlink/uplink combination | | | | |

### 6.22.2 Maximum output power

Table 6.22.2-1 UE Power Class 2 for uplink inter-band CA (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Uplink CA configuration** | **Power class 2 cases for CA\_nX-nY** | **CA power class** | **Carrier X power class** | **Carrier Y power class** |
| CA\_n41A-n66A | Case a | 26dBm | 23dBm | 23dBm |
| Case c | 26dBm | 26dBm | 23dBm |

### 6.22.3 REFSENS requirements

#### 6.22.3.1 Power class 2 case a

Since there is no MSD for PC3 UL CA\_n41A-n66A into CA\_n41-n66-n71, none is proposed for PC2.

#### 6.22.3.2 Power class 2 case c

Since there is no MSD for PC3 UL CA\_n41A-n66A into CA\_n41-n66-n71, none is proposed for PC2.

### 6.22.4 Void

6.23 CA\_n3-n28-n41

6.23.1 Configurations

**Table 6.23.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (two bands)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **NR CA configuration** | **Uplink CA configuration or**  **single uplink carrier** | **NR Band** | **Channel bandwidth (MHz)** | **Bandwidth combination set** |
| CA\_n3A-n28A-n41A | CA\_n3A-n28A  CA\_n3A-n41A7  CA\_n28A-n41A7 | n3 | 5, 10, 15, 20, 25, 30, 40 | 0 |
| n28 | 5, 10, 15, 20, 30 |
| n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100 |
| NOTE 7: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination | | | | |

6.23.2 Maximum output power

**Table 6.23.2-1 UE Power Class 2 for uplink inter-band CA (two bands)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Uplink CA configuration** | **Power class 2 cases for CA\_nX-nY** | **CA power class** | **Carrier X power class** | **Carrier Y power class** |
| CA\_n3-n41 | Case a | 26dBm | 23dBm | 23dBm |
| Case b | 26dBm | 23dBm | 26dBm |
| CA\_n28-n41 | Case a | 26dBm | 23dBm | 23dBm |
| Case b | 26dBm | 23dBm | 26dBm |

6.23.3 REFSENS requirements

Analysis of REFSENS exceptions or MSD requirements is needed due to higher power uplink.

6.23.3.1 Power class 2 case a, b

Based on calculation, IMD2 and IMD3 of dual UL CA\_n3-n41 fall into n28 DL, IMD2 of dual UL CA\_n28-n41 falls into n3 DL.

Table 6.23.3-13 DL/2UL interband Reference sensitivity QPSK PREFSENS and uplink/downlink configurations for PC2 CA

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Band / Channel bandwidth / NRB / Duplex mode** | | | | | | | | **Source of IMD** |
| **NR CA band combination** | **NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL  CLRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** |  |
| CA\_n3-n28-n41 | n3 | 1720 | 5 | 25 | 1815 | N/A | FDD | N/A |
|  | n28 | 735 | 5 | 25 | 790 | 32 | FDD | IMD24 |
|  | n41 | 2510 | 5 | 25 | 2510 | N/A | TDD | N/A |
|  | n3 | 1737.5 | 5 | 25 | 1832.5 | 32 | FDD | IMD2 |
|  | n28 | 710.5 | 5 | 25 | 765.5 | N/A | FDD | N/A |
|  | n41 | 2543 | 10 | 50 | 2543 | N/A | TDD | N/A |
| NOTE 4: This band is subject to IMD3 also which MSD is not specified. | | | | | | | | |

6.23.4 ∆TIB and ∆RIB values

There is no change by comparing to the values for PC3 CA, so this section is omitted.

6.24 CA\_n3-n41-n77

6.24.1 Configurations

**Table 6.24.1-1: NR CA configurations and bandwidth combinations sets defined for inter-band CA (two bands)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **NR CA configuration** | **Uplink CA configuration or**  **single uplink carrier** | **NR Band** | **Channel bandwidth (MHz)** | **Bandwidth combination set** |
| CA\_n3A-n41A-n77A | CA\_n3A-n41A7  CA\_n3A-n77A7  CA\_n41A-n77A7 | n3 | 5, 10, 15, 20, 25, 30, 40 | 0 |
| n41 | 10, 15, 20, 30, 40, 50, 60, 80, 90, 100 |
| n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |
| NOTE 7: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination | | | | |

6.24.2 Maximum output power

**Table 6.24.2-1 UE Power Class 2 for uplink inter-band CA (two bands)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Uplink CA configuration** | **Power class 2 cases for CA\_nC** | **CA power class** | **Carrier X power class** | **Carrier Y power class** |
| CA\_n3-n41 | Case a | 26dBm | 23dBm | 23dBm |
| Case b | 26dBm | 23dBm | 26dBm |
| CA\_n3-n77 | Case a | 26dBm | 23dBm | 23dBm |
| Case b | 26dBm | 23dBm | 26dBm |
| CA\_n41-n77 | Case a | 26dBm | 23dBm | 23dBm |
| Case b | 26dBm | 23dBm | 26dBm |
| Case c | 26dBm | 26dBm | 23dBm |
| Case d | 26dBm | 26dBm | 26dBm |

6.24.3 REFSENS requirements

Analysis of REFSENS exceptions or MSD requirements is needed due to higher power uplink.

6.24.3.1 Power class 2 case a, b, c, d

Based on calculation, IMD3/5 of dual UL CA\_n3-n41 fall into n77 DL; IMD3/4 of dual UL CA\_n41-n77 falls into n3 DL; IMD5 of dual UL CA\_n3-n77 falls into n41 DL.

Table 6.24.3-13 DL/2UL interband Reference sensitivity QPSK PREFSENS and uplink/downlink configurations for PC2 CA

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Band / Channel bandwidth / NRB / Duplex mode** | | | | | | | | **Source of IMD** |
| **NR CA band combination** | **NR band** | **UL Fc  (MHz)** | **UL/DL BW  (MHz)** | **UL  CLRB** | **DL Fc (MHz)** | **MSD  (dB)** | **Duplex mode** |  |
| CA\_n3-n41-n77 | n3 | 1720 | 5 | 25 | 1815 | N/A | FDD | N/A |
|  | n41 | 2580 | 5 | 25 | 2580 | N/A | TDD | N/A |
|  | n77 | 3440 | 10 | 50 | 3440 | 25.6 | TDD | IMD31 |
|  | n3 | 1745 | 5 | 25 | 1840 | 25.1 | FDD | IMD32 |
|  | n41 | 2620 | 5 | 25 | 2620 | N/A | TDD | N/A |
|  | n77 | 3400 | 10 | 50 | 3400 | N/A | TDD | N/A |
|  | n3 | 1720 | 5 | 25 | 1815 | N/A | FDD | N/A |
|  | n41 | 2640 | 5 | 25 | 2640 | 13 | TDD | IMD5 |
|  | n77 | 3900 | 10 | 50 | 3900 | N/A | TDD | N/A |
| NOTE 1: This band is subject to IMD5 also which MSD is not specified.  NOTE 2: This band is subject to IMD4 also which MSD is not specified. | | | | | | | | |

6.24.4 ∆TIB and ∆RIB values

There is no change by comparing to the values for PC3 CA, so this section is omitted.

# 7 Power class 2 CA with SUL

## 7.x CA\_nW-nX\_SUL\_nY-nZ

### 7.x.1 Configurations

*<Editor’s note: the CA configurations and bandwidth combinations sets should be kept same as defined in 38.101-1 Table 5.5C-4 unless additional clarification>*

Table 7.x.1-1: NR CA configurations and bandwidth combinations sets for supporting power class 2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR CA configuration | Uplink configuration | NR Band | Channel Bandwidth | Bandwidth combination set |
| *CA\_nW-nX\_SUL\_nY-nZ* | *SUL\_nY-nZ* | *nW* |  |  |
| *nX* |  |
| *nY* |  |
| *nZ* |  |

### 7.x.2 Maximum output power

### 7.x.3 REFSENS requirements

*<Editor’s note: This agenda will capture the Reference sensitivity exceptions or MSD requirements due to higher power for CA carrier, please use the same table format as in 38101-1. >*

### 7.x.4 ∆TIB and ∆RIB values

*<Editor’s note: If no change by comparing to the values for power class 3 CA, this section will be void.>*

# Annex <A> (informative): Change history

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Change history** | | | | | | | |
| **Date** | **Meeting** | **TDoc** | **CR** | **Rev** | **Cat** | **Subject/Comment** | **New version** |
| 2022-11 | RAN4 #105 | R4-2219272 |  |  |  | TR skeleton | 0.0.1 |
| 2022-11 | RAN4#105 | R4-2220844 |  |  |  | The following TPs are approved:  R4-2220470 TP for HPUE CA\_n77-n79 with 1UL for TR 38.899, NTT DOCOMO Inc  R4-2220471 TP for HPUE CA\_n78-n79 with 1UL for TR 38.899, NTT DOCOMO Inc  R4-2220472 TP for TR38.899 for DL CA\_n25-n41-n66 with PC2 2BUL, T-Mobile USA  R4-2220004 TP for TR38.899 for DL CA\_n25-n41-n71 with PC2 2BUL, T-Mobile USA  R4-2220475 TP for TR38.899 for DL CA\_n25-n41-n77 with PC2 2BUL, T-Mobile USA  R4-2220476 TP for TR38.899 for DL CA\_n25-n66-n77 with PC2 2BUL, T-Mobile USA  R4-2220477 TP for TR38.899 for DL CA\_n25-n71-n77 with PC2 2BUL, T-Mobile USA  R4-2220008 TP for TR38.899 for DL CA\_n41-n66-n71 with PC2 2BUL, T-Mobile USA  R4-2220478 TP for TR38.899 for DL CA\_n41-n66-n77 with PC2 2BUL, T-Mobile USA  R4-2220479 TP for TR38.899 for DL CA\_n41-n71-n77 with PC2 2BUL, T-Mobile USA  R4-2220480 TP for TR38.899 for DL CA\_n66-n71-n77 with PC2 2BUL, T-Mobile USA  R4-2220012 TP for TR38.899 for DL CA\_n25-n41C with PC2 UL CA\_n41C, T-Mobile USA  R4-2220013 TP for TR38.899 for DL CA\_n41C-n66 with PC2 UL CA\_n41C, T-Mobile USA  R4-2220014 TP for TR38.899 for DL CA\_n41C-n71 with PC2 UL CA\_n41C, T-Mobile USA  R4-2220015 TP for TR38.899 for DL CA\_n41C-n77 with PC2 UL CA\_n41C, T-Mobile USA | 0.1.0 |
| 2023-03 | RAN4#106 | R4-2300720 |  |  |  | The following TPs are approved:  R4-2303453 TP for HPUE CA\_n3-n41 with 1UL for TR 38.899, Samsung, KDDI  R4-2303456 TP for HPUE CA\_n3-n77 with 1UL and 2UL for TR 38.899, Samsung, KDDI  R4-2303528 TP for TR38.899 PC2 CA\_n8A-n78A, ZTE Corporation, China Unicom, CHTTL  R4-2303454 TP for HPUE CA\_n40-n77 with 1UL for TR 38.899, Samsung, KDDI  R4-2301130 TP for HPUE CA\_n3-n28-n41 with 2UL for TR 38.899, Samsung, KDDI  R4-2301132 TP for HPUE CA\_n3-n41-n77 with 2UL for TR 38.899, Samsung, KDDI | 0.2.0 |