**3GPP TSG-RAN4 Meeting #98-e *R4-2102151***

**Online, , 25th Jan 2021 - 5th Feb 2021**

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| *CR-Form-v12.1* | | | | | | | | |
| **DRAFT CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.101-1** | **CR** |  | **rev** | 1 | **Current version:** | **17.0.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network |  |

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|  | | | | | | | | | | |
| ***Title:*** | Draft CR for 38.101-1: Introduction of BCS4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | T-Mobile USA | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_BCS4-Core | | | | |  | ***Date:*** | | | 2021-01-15 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | B |  | | | | | ***Release:*** | | | Rel-17 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Draft CR for the introduction of BCS4. Cells with MSD needed configuration cells needed for BCS4 due to additional channel bandwdiths are highlighted in yellow. This draft CR used the draft version of 38.101-1 v17.0.0 with changes accepted. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Adds BCS4 including MSD and MSD UL configurations. MSD with NOTE x indicate that the MSD is a placeholder. In the WID using infinity was a placeholder, but this draft CR used the MSD from the next smaller channel BW as a placeholder. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | BCS4 not available in 38.101-1 | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 5.5A.0, 7.3A.4, 6.3A.6, 7.3C.2, 7.3G.5 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **x** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **x** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **x** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | Rev 1 removed the MTK comments, Changeed 1.5 to 1.4 for n1->n3 in Table 7.3A.6-1. Also cleaned up some of the accidental table formating. | | | | | | | | |

<Start of Changes>

### 5.5A.0 General

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

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

The configuration tables for CA describe Bandwidth Combination Sets. Bandwidth Combination Set 4 (BCS4) contains all possible defined channel bandwidths for each band in the combination. BCS4 is an available for every CA combinations. The fact that BCS4 contains all channel bandwidths for each band does not alter if a bandwidth is mandatory or optional for a given band. Bandwidths are identified as optional in Table 5.3.5-1. The bandwidths the UE supports for each band and the maximum bandwidth for the band in the band combination as indicated in the UE capabilities.

<Next Changed Section >

### 7.3A.4 Reference sensitivity exceptions due to UL harmonic interference for CA

Sensitivity degradation is allowed for a band in frequency range 1 if it is impacted by UL harmonic interference from another band in frequency range 1 of the same CA configuration. Reference sensitivity exceptions are specified in Table 7.3A.4-1 with uplink configuration specified in Table 7.3A.4-2.

Table 7.3A.4-1: Reference sensitivity exceptions due to UL harmonic for NR CA FR1

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| MSD due to harmonic exception for the DL band | | | | | | | | | | | | | | |
| UL band | DL band | 5 MHz | 10 MHz | 15 MHz | 20 MHz | 25 MHz | 30 MHz | 40 MHz | 50 MHz | 60 MHz | **70**  MHz | 80 MHz | 90 MHz | 100 MHz |
|  |  | dB | dB | dB | dB | dB | dB | dB | dB | dB |  | dB | dB | dB |
| n1 | n771,2 |  | 23.9 | 22.1 | 20.9 | 19.8 | 19.0 | 17.9 | 16.8 | 16.0 | 15.4 | 14.8 | 14.3 | 13.8 |
|  | n773 |  | 1.1 | 0.8 | 0.3 |  |  |  |  |  |  |  |  |  |
| n2 | n481, 2 | 27.1 | 23.9 | 22.1 | 20.9 |  | 19.0 | 17.9 | 16.912 | 16.112 | 15.412 | 14.812 | 14.312 | 13.812 |
|  | n483 | 1.9 | 1.1 | 0.8 | 0.3 |  |  |  |  |  |  |  |  |  |
| n2 | n771, 2 |  | 23.9 | 22.1 | 20.9 | 19.8 | 19.0 | 17.9 | 16.8 | 16.0 | 15.8 | 15.5 | 14.8 | 14.3 |
|  | n773 |  | 1.1 | 0.8 | 0.3 | 0.1 |  |  |  |  |  |  |  |  |
| n2 | n781,2 |  | 23.9 | 22.1 | 20.9 | 20.2 | 19.4 | 17.9 | 16.8 | 16.0 | 15.4 | 14.8 | 14.3 | 13.8 |
|  | n783 |  | 1.1 | 0.8 | 0.3 |  |  |  |  |  |  |  |  |  |
| n3 | n771,2 |  | 23.9 | 22.1 | 20.9 | 19.8 | 19.0 | 17.9 | 16.9 | 16.1 | 15.4 | 14.8 | 14.3 | 13.8 |
|  | n773 |  | 1.1 | 0.8 | 0.3 |  |  |  |  |  |  |  |  |  |
|  | n781,2 |  | 23.9 | 22.1 | 20.9 | 19.8 | 19.0 | 17.9 | 16.9 | 16.1 | 15.4 | 14.8 | 14.3 | 13.8 |
|  | n783 |  | 1.1 | 0.8 | 0.3 |  |  |  |  |  |  |  |  |  |
| n5 | n774, 5 |  | 10.5 | 8.9 | 7.8 | 7.2 | 6.5 | 5.1 | 4.2 | 3.5 | 3.2 | 2.8 | 2.3 | 2.1 |
| n5 | n776,7 |  | 10.4 | 8.9 | 7.8 | 7.4 | 6.5 | 4.7 | 3.7 | 3 | 2.7 | 2.35 | 1.7 | 1.2 |
| n5 | n784,5 |  | 10.5 | 8.9 | 7.8 | 7.4 | 6.5 | 5.4 | 4.2 | 3.5 | 2.9 | 2.3 | 2.1 | 1.4 |
| n8 | n311 | N/A | N/A | N/A | N/A | N/A | N/A |  |  |  |  |  |  |  |
|  | n418,9 |  | 13.0 | 11.3 | 10.1 |  | 8.3 | 7.0 | 6.1 | 5.5 | 4.9 | 4.3 | 3.9 | 3.5 |
|  | n784,5 |  | 10.8 | 9.1 | 8.0 | 7.2 | 6.5 | 5.1 | 4.2 | 3.5 |  | 2.3 | 2.1 | 1.4 |
|  | n796,7 |  |  |  |  |  |  | 6.8 | 6.2 | 5.6 |  | 4.9 |  | 4.4 |
| n20 | n784,5 |  | 10.8 | 9.1 | 8 | 7.2 | 6.5 | 6 | 4.0 | 3.2 | 2.6 | 2.0 | 1.5 | 1.0 |
| n25 | n481,2 | 27.1 | 23.9 | 22.1 | 20.9 |  | 19.0 | 17.9 | 16.912 | 16.112 | 15.412 | 14.812 | 14.312 | 13.812 |
|  | n483 | 1.9 | 1.1 | 0.8 | 0.3 |  |  |  |  |  |  |  |  |  |
| n25 | n771,2 |  | 23.9 | 22.1 | 20.9 | 19.8 | 19.0 | 17.9 | 16.8 | 16.0 | 15.8 | 15.5 | 14.8 | 14.3 |
|  | n773 |  | 1.1 | 0.8 | 0.3 | 0.1 |  |  |  |  |  |  |  |  |
| 25 | n781,2 |  | 23.9 | 22.1 | 20.9 | 19.8 | 19.0 | 17.9 | 16.8 | 16.0 | 15.4 | 14.8 | 14.3 | 13.8 |
|  | n783 |  | 1.1 | 0.8 | 0.3 |  |  |  |  |  |  |  |  |  |
| n28 | n18,9 | 10.2 | 7.6 | 6.2 | 5.3 | [5.3]x | [5.3]x | [5.3]x | [5.3]x |  |  |  |  |  |
|  | n501,2 |  | 19.8 | 18.0 | 16.8 |  | 15.0 | 13.8 | 12.8 | 12.0 |  | 10.8 |  |  |
|  | n751,2 | 28.1 | 25.3 | 24.0 | 22.8 | 21.8 | 21.0 | 19.7 | 18.7 |  |  |  |  |  |
|  | n776,7 |  | 10.4 | 8.9 | 7.8 | 6.7 | 6 | 4.7 | 3.7 | 3 | 2.3 | 1.7 | 1.2 | 0.7 |
|  | n786,7 |  | 10.4 | 8.9 | 7.8 | 6.7 | 6 | 4.7 | 3.7 | 3 | 2.3 | 1.7 | 1.2 | 0.7 |
| n66 | n481, 2 | 27.1 | 23.9 | 22.1 | 20.9 |  | 19.0 | 17.9 | 16.912 | 16.112 | 15.412 | 14.812 | 14.312 | 13.812 |
|  | n483 | 1.9 | 1.1 | 0.8 | 0.3 |  |  |  |  |  |  |  |  |  |
| n66 | n771, 2 |  | 23.9 | 22.1 | 20.9 | 19.8 | 19.0 | 17.9 | 16.8 | 16.0 | 15.8 | 15.3 | 14.8 | 14.3 |
|  | n773 |  | 1.1 | 0.8 | 0.3 | 0.1 |  |  |  |  |  |  |  |  |
| n66 | n781,2 |  | 23.9 | 22.1 | 20.9 | 19.8 | 19.0 | 17.9 | 16.8 | 16.0 | 15.4 | 14.8 | 14.3 | 13.8 |
|  | n783 |  | 1.1 | 0.8 | 0.3 |  |  |  |  |  |  |  |  |  |
| n71 | n2510 | 10 | 7.5 | 6 | 5.1 | [5.1]x | [5.1]x | [5.1]x |  |  |  |  |  |  |
|  | n414,5 |  | 10.8 | 9.1 | 8.0 |  | 6.5 | 5.1 | 4.2 | 3.5 | 2.9 | 2.3 | 2.1 | 1.4 |
|  | n708,9 | 9.9 | 7.1 | 6.7 | 4.9 | 4.1 |  |  |  |  |  |  |  |  |
| n92 | n784,5 |  | 10.8 | 9.1 | 8 | 7.2 | 6.5 | 6 | 4.0 | 3.2 | 2.6 | 2.0 | 1.5 | 1.0 |
| NOTE 1: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the aggressor (lower) band for which the 2nd transmitter harmonic is within the downlink transmission bandwidth of a victim (higher) band and a range ∆FHD above and below the edge of this downlink transmission bandwidth. The value ∆FHD depends on the band combination: ∆FHD = 10 MHz for CA\_n1-n77, CA\_n2-n78, CA\_n3-n77, CA\_n3-n78, CA\_n2-n48, CA\_n25-n48, CA\_n25-n78, CA\_n48-n66, CA\_n66-n78.  NOTE 2: The requirements should be verified for UL NR-ARFCN of the aggressor (lower) band (superscript LB) such that in MHz and  with carrier frequency in the victim (higher) band in MHz and  the channel bandwidth configured in the lower band.  NOTE 3: The requirements are only applicable to channel bandwidths no larger than 20 MHz and with a carrier frequency at  MHz offset from  in the victim (higher band) with , whereandare the channel bandwidths configured in the aggressor (lower) and victim (higher) bands in MHz, respectively.  NOTE 4: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of a low band for which the 4th transmitter harmonic is within the downlink transmission bandwidth of a high band.  NOTE 5: The requirements should be verified for UL NR‑ARFCN of a low band (superscript LB) such that in MHz and  with the carrier frequency of a high band in MHz and  the channel bandwidth configured in the low band.  NOTE 6: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of a low band for which the 5th transmitter harmonic is within the downlink transmission bandwidth of a high band.  NOTE 7: The requirements should be verified for UL NR‑ARFCN of a low band (superscript LB) such that in MHz and  with the carrier frequency of a high band in MHz and  the channel bandwidth configured in the low band.  NOTE 8: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the aggressor (lower) band for which the 3nd transmitter harmonic is within the downlink transmission bandwidth of a victim (higher) band.  NOTE 9: The requirements should be verified for UL NR-ARFCN of the aggressor (lower) band (superscript LB) such that in MHz and  with carrier frequency in the victim (higher) band in MHz and  the channel bandwidth configured in the lower band.  NOTE 10: These requirements apply when the lower edge frequency of the 10 MHz, 15 MHz, or 20 MHz uplink channel in Band 71 is located at or below 668 MHz and the downlink channel in Band n25 is located with its upper edge at 1995 MHz.  NOTE 11: No requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the low band for which the 2nd transmitter harmonic is within the downlink transmission bandwidth of the high band. The reference sensitivity for all active downlink component carriers is only verified when this is not the case (the requirements specified in clause 7.3.2 apply unless otherwise specified).  NOTE 12: For these bandwidths, the minimum requirements are restricted to operation when carrier is configured as a downlink carrier part of CA configuration.  NOTE x: This MSD value is a placeholder to enable BCS4 in this version of the spec. It may be updated in future version of the spec based on contributions. | | | | | | | | | | | | | | |

Table 7.3A.4-2: Uplink configuration for reference sensitivity exceptions due to UL harmonic interference for NR CA, FR1

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR Band / Channel bandwidth of the high band | | | | | | | | | | | | | | |
| UL band | DL band | 5 MHz | 10 MHz | 15 MHz | 20 MHz | 25 MHz | 30 MHz | 40 MHz | 50 MHz | 60 MHz | 70  MHz | 80 MHz | 90 MHz | 100 MHz |
| n1 | n77 |  | 25 | 36 | 50 | 64 | 80 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| n2 | n48 | 25 | 50 | 50 | 50 |  | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| n2 | n77 |  | 25 | 36 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| n2 | n78 |  | 25 | 36 | 50 |  |  | 50 | 50 | 50 |  | 50 | 50 | 50 |
| n3 | n77 |  | 25 | 36 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| n3 | n78 |  | 25 | 36 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| n5 | n77 |  | 16 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| n5 | n78 |  | 16 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| n8 | n41 |  | 16 | 25 | 25 |  | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| n8 | n78 |  | 16 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| n8 | n79 |  |  |  |  |  |  | 25 | 25 | 25 |  | 25 |  | 25 |
| n20 | n78 |  | 16 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| n25 | n48 | 25 | 50 | 50 | 50 |  | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| n25 | n77 |  | 25 | 36 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | n2 |
| n25 | n78 |  | 25 | 36 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| n28 | n1 | 8 | 16 | 25 | 25 |  |  |  |  |  |  |  |  |  |
| n28 | n50 |  | 25 | 25 | 25 |  |  | 25 | 25 | 25 |  | 25 |  |  |
| n28 | n75 | 12 | 25 | 36 | 50 | 50 | 50 | 50 | 50 |  |  |  |  |  |
| n28 | n77 |  | 10 | 15 | 20 |  |  | 25 | 25 | 25 |  | 25 | 25 | 25 |
| n28 | n78 |  | 10 | 15 | 20 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| n66 | n48 | 12 | 25 | 36 | 50 |  | 75 | 100 | 128 | 160 | [180]x | 200 | 200 | 200 |
| n66 | n77 |  | 25 | 36 | 50 | 64 | 80 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| n66 | n78 |  | 25 | 36 | 50 | 64 | 80 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| n71 | n25 | 84 | 84 | 84 | 84 | [8]x | [8]x | [8]x |  |  |  |  |  |  |
| n71 | n41 |  | 16 | 25 | 25 |  | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| n71 | n70 | 8 | 16 | 20 | 20 | 20 |  |  |  |  |  |  |  |  |
| n92 | n78 |  | 16 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| NOTE 1: 15 kHz SCS is assumed for UL band.  NOTE 2: The UL configuration applies regardless of the channel bandwidth of the low band unless the UL resource blocks exceed that specified in Table 7.3.2-3 for the uplink bandwidth in which case the allocation according to Table 7.3.2-3 applies.  NOTE 3: Unless stated otherwise, UL resource blocks shall be centred within the transmission bandwidth configuration for the channel bandwidth.  NOTE 4: These requirements apply when the lower edge frequency of the uplink channel in Band n71 is located at or below 668 MHz and the downlink channel in Band n25 is located with its upper edge at 1990 MHz.  NOTE x: This configuration is a placeholder to enable BCS4 in this version of the spec. It may be updated in future version of the spec based on contributions. | | | | | | | | | | | | | | |

Table 7.3A.4-3: Void

Table 7.3A.4-3a: Void

Sensitivity degradation is allowed for a band if it is impacted by receiver harmonic mixing due to another band part of the same CA configuration. Reference sensitivity exceptions are specified in Table 7.3A.4-4 with uplink configuration specified in Table 7.3A.4-4a.

Table 7.3A.4-4: Reference sensitivity exceptions due to harmonic mixing for CA in NR FR1

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR Band / Channel bandwidth of the affected DL band | | | | | | | | | | | | | | |
| UL band | DL band | 5 MHz  (dB) | 10 MHz  (dB) | 15 MHz  (dB) | 20 MHz  (dB) | 25 MHz  (dB) | 30  MHz(dB) | 40 MHz  (dB) | 50 MHz  (dB) | 60 MHz  (dB) | 70  MHz(dB) | 80 MHz  (dB) | 90 MHz  (dB) | 100 MHz  (dB) |
| n25 | n713,4 | 26.5 | 23.3 | 20.9 | 15.3 |  |  |  |  |  |  |  |  |  |
| n40 | n284 | 37.8 | 34.8 | 33 | 30.3 |  | [30.3]x |  |  |  |  |  |  |  |
| n40 | n781 |  | 8.3 | 8.0 | 6.9 | [6.9]x | [6.9]x | 3.9 | 3 | 2.3 | [2.3]x | 1.2 | [1.2]x | 0.4 |
| n41 | n781 |  | 8.3 | 8.0 | 6.9 | [6.9]x | [6.9]x | 3.9 | 3 | 2.3 | [2.3]x | 1.2 | [1.2]x | 0.4 |
| n77 | n2 | 6.7 | 5.0 | 4.0 | 3.7 |  |  |  |  |  |  |  |  |  |
| n77 | n5 | 5.7 | 4.0 | 3.0 | 2.7 |  |  |  |  |  |  |  |  |  |
| n77 | n25 | 6.7 | 5.0 | 4.0 | 3.7 | [3.7]x | [3.7]x | [3.7]x |  |  |  |  |  |  |
| n77 | n412 |  | 10.4 | 10.4 | 10.4 | 10.4 | 10.4 | 10.4 | 10.4 | 10.4 | 10.4 | 10.4 | 10.4 | 10.4 |
| n78 | n402 | 10.4 | 10.4 | 10.4 | 10.4 | [10.4]x | [10.4]x | 7.2 | 6.2 | 5.5 | [5.5]x | 4.5 |  |  |
| n78 | n412 |  | 10.4 | 10.4 | 10.4 |  | [10.4]x | 8.2 | 7.6 | 7.3 | [7.3]x | 6.6 | 6.4 | 6.3 |
| NOTE 1: The requirements should be verified for UL NR-ARFCN of the aggressor (lower) band (superscript LB) such that in MHz and  with carrier frequency in the victim (higher) band in MHz and  the channel bandwidth configured in the lower band.  NOTE 2: The requirements should be verified for UL NR-ARFCN of the aggressor (high) band (superscript HB) such that in MHz and  with carrier frequency in the victim (lower) band in MHz and  the channel bandwidth configured in the higher band.  NOTE 3: These requirements apply when there is at least one individual RE within the downlink transmission bandwidth of the victim (lower) band for which the 3rd harmonic is within the uplink transmission bandwidth or the uplink adjacent channel's transmission bandwidth of an aggressor (higher) band.  NOTE 4: 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.  NOTE x: This MSD value is a placeholder to enable BCS4 in this version of the spec. It may be updated in future version of the spec based on contributions. | | | | | | | | | | | | | | |

Table 7.3A.4-4a: Uplink configuration for reference sensitivity exceptions due to receiver harmonic mixing for CA in NR FR1

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR Band / SCS / Channel bandwidth of the affected DL band | | | | | | | | | | | | | | | |
| UL band | DL band | SCS  (kHz) | 5 MHz | 10 MHz | 15 MHz | 20 MHz | 25 MHz | 30  MHz | 40 MHz | 50 MHz | 60 MHz | 70  MHz | 80 MHz | 90 MHz | 100 MHz |
| n25 | n71 | 15 | 25 | 50 | 75 | 100 |  |  |  |  |  |  |  |  |  |
| n40 | n28 | 15 | 25 | 50 | 75 | 100 |  | [100]x |  |  |  |  |  |  |  |
| n40 | n78 | 30 |  | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| n41 | n78 | 30 |  | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| n77 | n2 | 15 | 25 | 50 | 75 | 100 |  |  |  |  |  |  |  |  |  |
| n77 | n5 | 25 | 25 | 20 | 20 |  |  |  |  |  |  |  |  |  |  |
| n77 | n25 | 15 | 25 | 50 | 75 | 100 | [100]x | [100]x | [100]x |  |  |  |  |  |  |
| n77 | 41 | 15 |  | 25 | 36 | 50 |  | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| n78 | n40 | 30 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |  |  |
| n78 | n41 | 30 |  | 50 | 50 | 50 |  | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| NOTE 1: The UL configuration applies regardless of the channel bandwidth of the UL band unless the UL resource blocks exceed that specified in Table 7.3.2-3 for the uplink bandwidth in which case the allocation according to Table 7.3.2-3 applies.  NOTE x: This MSD value is a placeholder to enable BCS4 in this version of the spec. It may be updated in future version of the spec based on contributions. | | | | | | | | | | | | | | | |

### 7.3A.5 Reference sensitivity exceptions due to intermodulation interference due to 2UL CA

For inter-band carrier aggregation with uplink assigned to two NR bands given in Table 7.3A.5-1, Table 7.3A.5-1a and Table 7.3A.5-2 the reference sensitivity is defined only for the specific uplink and downlink test points specified in Table 7.3A.5-1, Table 7.3A.5-1a and Table 7.3A.5-2. For these test points the reference sensitivity requirement specified in Table 7.3.2-1 and Table 7.3.2-2 are relaxed by the amount of the corresponding parameter MSD given in Table 7.3A.5-1, Table 7.3A.5-1a and Table 7.3A.5-2.

Table 7.3A.5-1: 2DL/2UL interband Reference sensitivity QPSK PREFSENS and uplink/downlink configurations for PC3 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\_n1-n3 | n1 | 1950 | 5 | 25 | 2140 | 23 | FDD | IMD3 |
|  | n3 | 1760 | 5 | 25 | 1855 | N/A | TDD | N/A |
| CA\_n1-n8 | n1 | 1965 | 5 | 25 | 2155 | 6.0 | FDD | IMD4 |
|  | n8 | 887.5 | 5 | 25 | 932.5 | N/A | FDD | N/A |
| CA\_n1A-n77A | 1 | 1950 | 5 | 25 | 2140 | 29.8 | FDD | IMD24 |
|  |  |  |  |  |  | 32.5 5 |  |  |
|  | n77 | 4090 | 10 | 50 | 4090 | N/A | TDD | N/A |
|  | 1 | 1950 | 5 | 25 | 2140 | 8.0 | FDD | IMD44 |
|  |  |  |  |  |  | 10.75 |  |  |
|  | n77 | 3710 | 10 | 50 | 3710 | N/A | TDD | N/A |
| CA\_n1-n78 | n1 | 1950 | 5 | 25 | 2140 | 8.0 | FDD | IMD4 |
|  |  |  |  |  |  | 10.75 |  |  |
|  | n78 | 3710 | 10 | 50 | 3710 | N/A | TDD | N/A |
| CA\_n2-n48  CA\_n2A-n48(A-C) | n2 | 1852.5 | 5 | 25 | 1932.5 | 12 | FDD | IMD4 |
|  | n48 | 3625 | 20 | 100 | 3625 | N/A | TDD | N/A |
| CA\_n2A-n66A | n2 | 1855 | 5 | 25 | 1935 | 20 | FDD | IMD3 |
|  | n66 | 1775 | 5 | 25 | 2175 | N/A | FDD | N/A |
|  | n2 | 1883.3 | 5 | 25 | 1963.3 | N/A | FDD | N/A |
|  | n66 | 1750 | 5 | 25 | 2150 | 4 | FDD | IMD5 |
| CA\_n2-n77 | n2 | 1855 | 5 | 25 | 1935 | 26 | FDD | IMD2 |
|  |  |  |  |  |  | 28.75 |  |  |
|  | n77 | 3790 | 10 | 50 | 3790 | N/A | TDD | N/A |
|  | n2 | 1885 | 5 | 25 | 1965 | 8.0 | FDD | IMD4 |
|  |  |  |  |  |  | 10.75 |  |  |
|  | n77 | 3690 | 10 | 50 | 3690 | N/A | TDD | N/A |
|  | n2 | 1885 | 5 | 25 | 1965 | 5 | FDD | IMD5 |
|  | n77 | 3790 | 10 | 50 | 3790 | N/A | TDD | N/A |
| CA\_n2-n78 | n2 | 1855 | 5 | 25 | 1935 | 26 | FDD | IMD24 |
|  |  |  |  |  |  | 28.75 |  |  |
|  | n78 | 3790 | 10 | 50 | 3790 | N/A | TDD | N/A |
| CA\_n3-n7 | n3 | 1730 | 5 | 25 | 1825 | N/A | FDD | N/A |
|  | n7 | 2535 | 10 | 50 | 2655 | 10.2 | FDD | IMD4 |
| CA\_n3-n8 | n3 | 1755 | 10 | 50 | 1850 | N/A | FDD | N/A |
|  | n8 | 900 | 5 | 25 | 945 | 8 | FDD | IMD44 |
|  | n3 | 1747.5 | 10 | 50 | 1842.5 | 6.4 | FDD | IMD5 |
|  | n8 | 897.5 | 5 | 25 | 942.5 | N/A | FDD | N/A |
| CA\_n3-n38 | n3 | 1713 | 5 | 25 | 1808 | 8.2 | FDD | IMD4 |
| n38 | 2617 | 5 | 25 | 2617 | N/A | TDD | N/A |
| CA\_n3-n41 | n3 | 1740 | 5 | 25 | 1835 | 8.2 | FDD | IMD4 |
|  | n41 | 2657.5 | 10 | 50 | 2657.5 | N/A | TDD | N/A |
| CA\_n3-n77 | n3 | 1740 | 5 | 25 | 1835 | 26 | FDD | IMD24 |
|  |  |  |  |  |  | 28.74 |  |  |
|  | n77 | 3575 | 10 | 50 | 3575 | N/A | TDD | N/A |
|  | n3 | 1765 | 5 | 25 | 1860 | 8.0 | FDD | IMD44 |
|  |  |  |  |  |  | 10.74 |  |  |
|  | n77 | 3435 | 10 | 50 | 3435 | N/A | TDD | N/A |
|  | n3 | N/A | N/A | N/A | N/A | N/A6 | FDD | IMD5 |
|  | n77 | N/A | N/A | N/A | N/A | N/A | TDD | N/A |
| CA\_n3-n78 | n3 | 1740 | 5 | 25 | 1835 | 26 | FDD | IMD24 |
|  |  |  |  |  |  | 28.75 |  |  |
|  | n78 | 3575 | 10 | 25 | 3575 | N/A | TDD | N/A |
|  | n3 | 1765 | 5 | 25 | 1860 | 8.0 | FDD | IMD44 |
|  |  |  |  |  |  | 10.75 |  |  |
|  | n78 | 3435 | 10 | 25 | 3435 | N/A | TDD | N/A |
| CA\_n5-n66  CA\_n5A-n66(2A) | n5 | 838 | 5 | 25 | 883 | 30 | FDD | IMD24 |
|  | n66 | 1721 | 5 | 25 | 2121 | N/A | FDD | N/A |
| CA\_n5-n77 | 5 | 844 | 5 | 25 | 889 | 8.3 | FDD | IMD4 |
|  | n77 | 3421 | 10 | 50 | 3421 | N/A | TDD | N/A |
|  | 5 | 829 | 5 | 25 | 875 | 5.5 | FDD | IMD5 |
|  | n77 | 3600 | 10 | 50 | 3600 | N/A | TDD | N/A |
| CA\_n5-n78  CA\_n5A-n78(2A) | n5 | 844 | 5 | 25 | 889 | 8.3 | FDD | IMD4 |
|  | n78 | 3421 | 10 | 50 | 3421 | N/A | TDD | N/A |
| CA\_n7-n66 | n7 | 2535 | 10 | 50 | 2655 | 15 | FDD | IMD4 |
|  | n66 | 1730 | 5 | 25 | 2130 | N/A | FDD | N/A |
| CA\_n8-n41 | n8 | 882.5 | 5 | 25 | 927.5 | 12.1 | FDD | IMD34 |
|  | n41 | 2685 | 10 | 50 | 2685 | N/A | TDD | N/A |
| CA\_n8-n78  CA\_n8A-n78(2A) | n8 | 897.5 | 5 | 25 | 942.5 | 8.3 | FDD | IMD4 |
|  | n78 | 3635 | 10 | 50 | 3635 | N/A | TDD | N/A |
| CA\_n8-n79 | n8 | 897.5 | 5 | 25 | 942.5 | 4.8 | FDD | IMD5 |
|  | n79 | 4532.5 | 40 | 216 | 4532.5 | N/A | TDD | N/A |
| CA\_n20-n78 | n20 | 850 | 5 | 25 | 809 | 11 | FDD | IMD4 |
|  | n78 | 3359 | 10 | 50 | 3359 | N/A | TDD | N/A |
| CA\_n25-n66 | n66 | 1775 | 5 | 25 | 2175 | N/A | FDD | N/A |
|  | n25 | 1855 | 5 | 25 | 1935 | 20 | FDD | IMD3 |
|  | n66 | 1712.5 | 5 | 25 | 2112.5 | 23 | FDD | IMD3 |
|  | n25 | 1912.5 | 5 | 25 | 1992.5 | N/A | FDD | N/A |
|  | n66 | 1750 | 5 | 25 | 2150 | 4 | FDD | IMD5 |
|  | n25 | 1883.3 | 5 | 25 | 1963.3 | N/A | FDD | N/A |
| CA\_n25A-n77A | n25 | 1855 | 5 | 25 | 1935 | 26 | FDD | IMD2 |
|  | n77 | 3790 | 10 | 50 | 3790 | N/A | TDD | N/A |
|  | n25 | 1885 | 5 | 25 | 1965 | 8.0 | FDD | IMD4 |
|  | n77 | 3690 | 10 | 50 | 3690 | N/A | TDD | N/A |
|  | n25 | 1885 | 5 | 25 | 1965 | 5 | FDD | IMD5 |
|  | n77 | 3790 | 10 | 50 | 3790 | N/A | TDD | N/A |
| CA\_n25-n78 | n25 | 1855 | 5 | 25 | 1935 | 26 | FDD | IMD24 |
|  | n78 | 3790 | 10 | 50 | 3790 | N/A | TDD | N/A |
| CA\_n28-n50 | n28 | 730 | 10 | 50 | 775 | 15.3 | FDD | IMD2 |
|  | n50 | 1500 | 10 | 50 | 1500 | N/A | TDD | N/A |
|  | n28 | 740 | 10 | 50 | 785 | 6.0 | FDD | IMD44 |
|  | n50 | 1500 | 10 | 50 | 1500 | N/A | TDD | N/A |
| CA\_n28A-n77(2A) | n28 | N/A | N/A | N/A | N/A | N/A7 | FDD | IMD2 |
|  | n77 | N/A | N/A | N/A | N/A | N/A | TDD | N/A |
| CA\_n28-n77 | n28 | 705.5 | 5 | 25 | 760.5 | 5.5 | FDD | IMD5 |
|  | n77/n78 | 3582.5 | 10 | 50 | 3582.5 | N/A | TDD | N/A |
| CA\_n41-n71  CA\_n41C-n71A | n41 | 2614 | 5 | 25 | 2614 | N/A | TDD | N/A |
|  | n71 | 665 | 5 | 25 | 619 | 11 | FDD | IMD4 |
| CA\_n48-n66  CA\_n48(2A)-n66A  CA\_n48C-n66A  CA\_n48(A-C)-n66A | n48 | 3660 | 5 | 25 | 3660 | N/A | TDD | N/A |
|  | n66 | 1730 | 5 | 25 | 2130 | 5.0 | FDD | IMD5 |
| CA\_n66-n71 | n66 | 1750 | 5 | 25 | 2150 | 5 | FDD | IMD4 |
|  | n71 | 675 | 5 | 25 | 629 | N/A | FDD | N/A |
| CA\_n66-n77  CA\_n66(2A)-n77A  CA\_n66A-n77(2A)  CA\_n66(2A)-n77(2A) | n66 | 1775 | 5 | 25 | 2175 | 31 | FDD | IMD2 |
|  | n77 | 3950 | 10 | 50 | 3950 | N/A | TDD | N/A |
|  | n66 | 1730 | 5 | 25 | 2130 | 5.0 | FDD | IMD5 |
|  | n77 | 3660 | 10 | 50 | 3660 | N/A | TDD | N/A |
| CA\_n66-n78 | n66 | 1730 | 5 | 25 | 2130 | 5.0 | FDD | IMD5 |
|  | n78 | 3660 | 10 | 50 | 3660 | N/A | TDD | N/A |
| CA\_n70-n71 | n70 | 1697.5 | 5 | 25 | 1997.5 | 5 | FDD | IMD4 |
|  | n71 | 695.5 | 5 | 25 | 649.5 | N/A | FDD | N/A |
| CA\_n71A-n77A | n71 | 671 | 5 | 25 | 625 | 5.5 | FDD | IMD5 |
|  | n77 | 3300 | 10 | 50 | 3300 | N/A | TDD | N/A |
| CA\_n71A-n78A  CA\_n71A-n78(2A) | n71 | 681.5 | 5 | 25 | 635.5 | 5.5 | FDD | IMD5 |
|  | n78 | 3361.5 | 10 | 50 | 3582.5 | N/A | TDD | N/A |
| NOTE 1: Both of the transmitters shall be set min(+20 dBm, PCMAX\_L,f,c) as defined in clause 6.2A.4  NOTE 2: RBSTART = 0, 15 kHz SCS is assumed.  NOTE 3: No requirements apply when there is at least one individual RE within the intermodulation generated by the dual uplink is within the downlink transmission bandwidth of the FDD band. The reference sensitivity should only be verified when this is not the case (the requirements specified in clause 7.3 apply).  NOTE 4: This band is subject to IMD5 also which MSD is not specified.  NOTE 5: Applicable only if operation with 4 antenna ports is supported in the band with carrier aggregation configured.  NOTE 6: Considering the spectrum holdings of the operator for CA\_n77(2A) (when one uplink sub block is assigned within 3300-3400MHz, the other uplink sub block is not assigned within 4000-4200MHz or vice versa), no IMD5 result will fall in Rx frequency range of band n3. Therefore, no MSD requirement apply for this CA configuration when two uplink sub blocks are assigned within CA\_77(2A).  NOTE 7: Considering the spectrum holdings of the operator for CA\_n77(2A) (when one uplink sub block is assigned within 3300-3400MHz, the other uplink sub block is not assigned within 4000-4200MHz or vice versa), no IMD2 result will fall in Rx frequency range of band n28. Therefore, no MSD requirement apply for this CA configuration when two uplink sub blocks are assigned within CA\_77(2A). | | | | | | | | |

Table 7.3A.5-1a: 2DL/2UL interband 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\_n1A-n78A | n1 | 1950 | 5 | 25 | 2140 | [17.8] | FDD | IMD4 |
|  | n78 | 3710 | 10 | 50 | 3710 | N/A | TDD | N/A |

Table 7.3A.5-2: 3DL/2UL interband Reference sensitivity QPSK PREFSENS and uplink/downlink configurations

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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\_n1-n3-n41 | n1 | 1977.5 | 5 | 25 | 2167.5 | N/A | FDD | N/A |
|  | n3 | 1712.5 | 5 | 25 | 1807.5 | N/A | FDD | N/A |
|  | n41 | 2507.5 | 10 | 25 | 2507.5 | 5.0 | TDD | IMD5 |
| CA\_n1-n3-n78 | n1 | 1950 | 5 | 25 | 2140 | N/A | FDD | N/A |
|  | n3 | 1750 | 5 | 25 | 1845 | N/A |  | N/A |
|  | n78 | 3700 | 10 | 52 | 3700 | 28.4 | TDD | IMD2 |
|  | n1 | 1950 | 5 | 25 | 2140 | N/A | FDD | N/A |
|  | n3 | 1770 | 5 | 25 | 1865 | N/A |  | N/A |
|  | n78 | 3360 | 10 | 52 | 3360 | 11.2 | TDD | IMD4 |
|  | n1 | 1950 | 5 | 25 | 2140 | N/A | FDD | N/A |
|  | n3 | 1735 | 5 | 25 | 1830 | 27.9 |  | IMD2 |
|  | n78 | 3780 | 10 | 52 | 3780 | N/A | TDD | N/A |
| CA\_n1-n7-n28 | n1 | 1935 | 5 | 25 | 2125 | N/A | FDD | N/A |
|  | n7 | 2533 | 10 | 50 | 2653 | 30.0 | FDD | IMD2 |
|  | n28 | 718 | 5 | 25 | 773 | N/A | FDD | N/A |
|  | n1 | 1935 | 5 | 25 | 2125 | N/A | FDD | N/A |
|  | n7 | 2510 | 10 | 50 | 2630 | N/A | FDD | N/A |
|  | n28 | 730 | 10 | 50 | 785 | 4.5 | FDD | IMD5 |
| CA\_n1-n7-n78 | n1 | 1977.5 | 5 | 25 | 2167.5 | N/A | FDD | N/A |
|  | n7 | 2507.5 | 5 | 25 | 2627.5 | 9.1 | FDD | IMD4 |
|  | n78 | 3305 | 10 | 50 | 3305 | N/A | TDD | N/A |
|  | n1 | 1950 | 5 | 25 | 2140 | 8.7 | FDD | IMD4 |
|  | n7 | 2510 | 10 | 50 | 2630 | N/A | FDD | N/A |
|  | n78 | 3580 | 10 | 50 | 3580 | N/A | TDD | N/A |
|  | n1 | 1970 | 5 | 25 | 2160 | N/A | FDD | N/A |
|  | n7 | 2520 | 5 | 25 | 2640 | N/A | FDD | N/A |
|  | n78 | 3390 | 10 | 50 | 3390 | 10.1 | TDD | IMD4 |
| CA\_n1A-n77A-n79A | n1 | 1950 | 5 | 25 | 2140 | [15.6] | FDD | IMD31,2 |
|  | n77 | 3400 | 10 | 50 | 3400 | N/A | TDD | N/A |
|  | n79 | 4660 | 40 | 216 | 4660 | N/A | TDD | N/A |
| CA\_n1A-n78A-n79A | n1 | 1950 | 5 | 25 | 2140 | N/A | FDD | N/A |
|  | n78 | 3410 | 10 | 50 | 3410 | N/A | TDD | N/A |
|  | n79 | 4870 | 40 | 216 | 4870 | 15.9 | TDD | IMD31,3 |
|  | n1 | 1950 | 5 | 25 | 2140 | N/A | FDD | N/A |
|  | n78 | 3490 | 10 | 50 | 3490 | 4.6 | TDD | IMD53 |
|  | n79 | 4670 | 40 | 216 | 4670 | N/A | TDD | N/A |
|  | n1 | 1950 | 5 | 25 | 2140 | 15.6 | FDD | IMD31,2 |
|  | n78 | 3400 | 10 | 50 | 3400 | N/A | TDD | N/A |
|  | n79 | 4660 | 40 | 216 | 4660 | N/A | TDD | N/A |
| CA\_n2A-n66A-n77A | n2 | 1880 | 5 | 25 | 1960 | N/A | FDD | N/A |
|  | n66 | 1740 | 5 | 25 | 2140 | N/A | FDD | N/A |
|  | n77 | 3620 | 10 | 50 | 3620 | 29.4 | TDD | IMD2 |
|  | n2 | 1880 | 5 | 25 | 1960 | N/A | FDD | N/A |
|  | n66 | 1740 | 5 | 25 | 2140 | N/A | FDD | N/A |
|  | n77 | 3340 | 10 | 50 | 3340 | 8.9 | TDD | IMD4 |
|  | n2 | 1860 | 5 | 25 | 1940 | N/A | FDD | N/A |
|  | n66 | 1750 | 5 | 25 | 2150 | 31.2 | FDD | IMD2 |
|  | n77 | 4010 | 10 | 50 | 4010 | N/A | TDD | N/A |
|  | n2 | 1880 | 5 | 25 | 1960 | N/A | FDD | N/A |
|  | n66 | 1760 | 5 | 25 | 2160 | 10.3 | FDD | IMD4 |
|  | n77 | 3480 | 10 | 50 | 3480 | N/A | TDD | N/A |
|  | n2 | 1860 | 5 | 25 | 1940 | N/A | FDD | N/A |
|  | n66 | 1740 | 5 | 25 | 2140 | 2.8 | FDD | IMD5 |
|  | n77 | 3860 | 10 | 50 | 3860 | N/A | TDD | N/A |
|  | n2 | 1880 | 5 | 25 | 1960 | 32.1 | FDD | IMD2 |
|  | n66 | 1740 | 5 | 25 | 2140 | N/A | FDD | N/A |
|  | n77 | 3700 | 10 | 50 | 3700 | N/A | TDD | N/A |
|  | n2 | 1880 | 5 | 25 | 1960 | 9.1 | FDD | IMD4 |
|  | n66 | 1770 | 5 | 25 | 2170 | N/A | FDD | N/A |
|  | n77 | 3350 | 10 | 50 | 3350 | N/A | TDD | N/A |
|  | n2 | 1880 | 5 | 25 | 1960 | 2.1 | FDD | IMD5 |
|  | n66 | 1760 | 5 | 25 | 2160 | N/A | FDD | N/A |
|  | n77 | 3620 | 10 | 50 | 3620 | N/A | TDD | N/A |
| CA\_n3-n8-n78 | n3 | 1730 | 5 | 25 | 1825 | N/A | FDD | N/A |
|  | n8 | 910 | 5 | 25 | 955 | N/A | FDD | N/A |
|  | n78 | 3550 | 10 | 50 | 3550 | 16.1 | TDD | IMD3 |
|  | n3 | 1730 | 5 | 25 | 1825 | N/A | FDD | N/A |
|  | n8 | 910 | 5 | 25 | 955 | N/A | FDD | N/A |
|  | n78 | 3370 | 10 | 50 | 3370 | 4.5 | TDD | IMD5 |
|  | n3 | 1725 | 5 | 25 | 1820 | 15.7 | FDD | IMD3 |
|  | n8 | 910 | 5 | 25 | 955 | N/A | FDD | N/A |
|  | n78 | 3640 | 10 | 50 | 3640 | N/A | TDD | N/A |
| CA\_n3A-n28A-n41A | n3 | 1715 | 5 | 25 | 1810 | N/A | FDD | N/A |
|  | n28 | 743 | 5 | 25 | 798 | N/A | FDD | N/A |
|  | n41 | 2518 | 5 | 25 | 2518 | 27.4 | TDD | IMD2 |
|  | n3 | 1715 | 5 | 25 | 1810 | N/A | FDD | N/A |
|  | n28 | 743 | 5 | 25 | 798 | N/A | FDD | N/A |
|  | n41 | 2687 | 5 | 25 | 2687 | 15.9 | TDD | IMD3 |
| CA\_n3-n28-n77 | n3 | 1720 | 5 | 25 | 1815 | N/A | FDD | N/A |
|  | n28 | 733 | 5 | 25 | 788 | N/A | FDD | N/A |
|  | n77 | 4173 | 10 | 50 | 4173 | 15.9 | TDD | IMD3 |
|  | n28 | 735 | 5 | 25 | 790 | N/A | FDD | N/A |
|  | n77 | 3320 | 10 | 50 | 3320 | N/A | TDD | N/A |
|  | n3 | 1755 | 5 | 25 | 1850 | 17.0 | FDD | IMD3 |
|  | n3 | 1712.5 | 5 | 25 | 1807.5 | N/A | FDD | N/A |
|  | n77 | 4195 | 10 | 50 | 4195 | N/A | TDD | N/A |
|  | n28 | 715 | 5 | 25 | 770 | 15.3 | FDD | IMD3 |
| CA\_n3-n28-n78  CA\_n3A-n28A-n78(2A) | n28 | 735 | 5 | 25 | 790 | N/A | FDD | N/A |
|  | n78 | 3320 | 10 | 50 | 3320 | N/A | TDD | IMD3 |
|  | n3 | 1755 | 5 | 25 | 1850 | 17.3 | FDD | N/A |
|  | n3 | 1750 | 5 | 25 | 1845 | N/A | FDD | N/A |
|  | n28 | 743 | 5 | 25 | 798 | N/A | FDD | N/A |
|  | n78 | 3764 | 10 | 50 | 3764 | 4.5 | TDD | IMD5 |
| CA\_n3-40-n41 | n3 | 1747.5 | 5 | 25 | 1842.5 | 1.0 | FDD | IMD5 |
|  | n40 | 2347.5 | 5 | 25 | 2347.5 | N/A | TDD | N/A |
|  | n41 | 2600 | 10 | 50 | 2600 | N/A | TDD | N/A |
| CA\_n5A-n25A-n66A  CA\_n5A-n25(2A)-n66A  CA\_n5A-n25A-n66(2A)  CA\_n5A-n25(2A)-n66(2A) | n5 | 834 | 5 | 25 | 879 | N/A | FDD | N/A |
|  | n25 | 1900 | 5 | 25 | 1980 | N/A | FDD | N/A |
|  | n66 | 1712 | 5 | 25 | 2132 | 7.2 | FDD | IMD4 |
| CA\_n5A-n25A-n78A  CA\_n5A-n25(2A)-n78A  CA\_n5A-n25A-n78(2A) | n5 | 830 | 5 | 25 | 875 | N/A | FDD | N/A |
|  | n25 | 1900 | 5 | 25 | 1980 | N/A | FDD | N/A |
|  | n78 | 3560 | 10 | 50 | 3560 | 16.1 | TDD | IMD3 |
| CA\_n5A-n66A-n77A | n5 | 830 | 5 | 25 | 875 | N/A | FDD | N/A |
|  | n66 | 1750 | 5 | 25 | 2150 | N/A | FDD | N/A |
|  | n77 | 3410 | 10 | 50 | 3410 | 16.1 | TDD | IMD3 |
|  | n5 | 826.5 | 5 | 25 | 871.5 | N/A | FDD | N/A |
|  | n66 | 1712.5 | 5 | 25 | 2112.5 | N/A | FDD | N/A |
|  | n77 | 4192 | 10 | 50 | 4192 | 8.2 | TDD | IMD4 |
|  | n5 | 830 | 5 | 25 | 875 | N/A | FDD | N/A |
|  | n66 | 1750 | 5 | 25 | 2150 | N/A | FDD | N/A |
|  | n77 | 3590 | 10 | 50 | 3590 | 3.3 | TDD | IMD5 |
|  | n5 | 830 | 5 | 25 | 875 | N/A | FDD | N/A |
|  | n66 | 1730 | 5 | 25 | 2130 | 14.4 | FDD | IMD3 |
|  | n77 | 3790 | 10 | 50 | 3790 | N/A | TDD | N/A |
| CA\_n5-n66-n78 | n5 | 830 | 5 | 25 | 875 | N/A | FDD | N/A |
|  | n66 | 1720 | 5 | 25 | 2120 | N/A | FDD | N/A |
|  | n78 | 3380 | 10 | 50 | 3380 | 16.1 | TDD | IMD3 |
| CA\_n5-n66-n78 | n5 | 830 | 5 | 25 | 875 | N/A | FDD | N/A |
|  | n66 | 1720 | 5 | 25 | 2120 | 13.2 | FDD | IMD3 |
|  | n78 | 3780 | 10 | 50 | 3780 | N/A | TDD | N/A |
| CA\_n7-n66-n78  CA\_n7(2A)-n66A-n78A  CA\_n7A-n66(2A)-n78A  CA\_n7(2A)-n66(2A)-n78A  CA\_n7(2A)-n66A-n78(2A)  CA\_n7(2A)-n66(2A)-n78(2A) | n7 | 2560 | 5 | 25 | 2680 | N/A | FDD | N/A |
|  | n66 | 1730 | 5 | 25 | 2130 | N/A | FDD | N/A |
|  | n78 | 3390 | 10 | 50 | 3390 | 16.1 | TDD | IMD3 |
| CA\_n7-n66-n78  CA\_n7(2A)-n66A-n78A  CA\_n7A-n66(2A)-n78A  CA\_n7(2A)-n66(2A)-n78A  CA\_n7(2A)-n66A-n78(2A)  CA\_n7(2A)-n66(2A)-n78(2A) | n7 | 2550 | 5 | 25 | 2670 | N/A | FDD | N/A |
|  | n66 | 1750 | 5 | 25 | 2150 | 8.7 | FDD | IMD4 |
|  | n78 | 3625 | 10 | 50 | 3625 | N/A | TDD | N/A |
| CA\_n25A-n41A-n77A  CA\_n25A-n41(2A)-n77A  CA\_n25A-n41C-n77A | n25 | 1870 | 5 | 25 | 1950 | N/A | FDD | N/A |
|  | n41 | 2610 | 5 | 25 | 2610 | N/A | TDD | N/A |
|  | n77 | 3350 | 10 | 50 | 3350 | 14.8 | TDD | IMD3 |
|  | n25 | 1900 | 5 | 25 | 1980 | N/A | FDD | N/A |
|  | n41 | 2525 | 5 | 25 | 2645 | N/A | TDD | N/A |
|  | n77 | 3775 | 10 | 50 | 3775 | 4.2 | TDD | IMD5 |
|  | n25 | 1870 | 5 | 25 | 1950 | N/A | FDD | N/A |
|  | n41 | 2640 | 5 | 25 | 2640 | 5.3 | TDD | IMD5 |
|  | n77 | 4125 | 10 | 50 | 4125 | N/A | TDD | N/A |
|  | n25 | 1870 | 5 | 25 | 1950 | 17.6 | FDD | IMD3 |
|  | n41 | 2565 | 5 | 25 | 2565 | N/A | TDD | N/A |
|  | n77 | 3180 | 10 | 50 | 3310 | 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 | 3475 | N/A | TDD | N/A |
| CA\_n25A-n66A-n77A | n25 | 1900 | 5 | 25 | 1980 | N/A | FDD | N/A |
|  | n66 | 1760 | 5 | 25 | 2160 | 29.2 | FDD | IMD2 |
|  | n77 | 4060 | 10 | 50 | 4060 | 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 |
|  | n25 | 1880 | 5 | 25 | 1960 | 32.1 | FDD | IMD2 |
|  | n66 | 1740 | 5 | 25 | 2140 | N/A | FDD | N/A |
|  | n77 | 3700 | 10 | 50 | 3700 | N/A | TDD | N/A |
|  | n25 | 1880 | 5 | 25 | 1960 | 9.1 | FDD | IMD4 |
|  | 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 | IMD5 |
|  | n66 | 1760 | 5 | 25 | 2160 | N/A | FDD | N/A |
|  | n77 | 3620 | 10 | 50 | 3620 | N/A | TDD | N/A |
|  | n25 | 1880 | 5 | 25 | 1960 | N/A | FDD | N/A |
|  | n66 | 1740 | 5 | 25 | 2140 | N/A | FDD | N/A |
|  | n77 | 3620 | 10 | 50 | 3620 | 29.4 | TDD | IMD2 |
|  | n25 | 1880 | 5 | 25 | 1960 | N/A | FDD | N/A |
|  | n66 | 1740 | 5 | 25 | 2140 | N/A | FDD | N/A |
|  | n77 | 3340 | 10 | 50 | 3340 | 8.9 | TDD | IMD4 |
| CA\_n25-n66-n78 | n25 | 1880 | 5 | 25 | 1960 | N/A | FDD | N/A |
|  | n66 | 1740 | 5 | 25 | 2140 | N/A | FDD | N/A |
|  | n78 | 3620 | 10 | 50 | 3620 | 29.4 | TDD | IMD2 |
| CA\_n25A-n71A-n77A | n25 | 1907.5 | 5 | 25 | 1987.5 | N/A | FDD | N/A |
|  | n71 | 695.5 | 5 | 25 | 649.5 | N/A | FDD | N/A |
|  | n77 | 3305 | 10 | 50 | 3305 | 8.0 | TDD | IMD31,2 |
|  | n25 | 1874 | 5 | 25 | 1954 | 16.5 | FDD | IMD32 |
|  | n71 | 693 | 5 | 25 | 647 | N/A | FDD | N/A |
|  | n77 | 3340 | 10 | 50 | 3340 | N/A | TDD | N/A |
| CA\_n28-n41-n78 | n28 | 738 | 5 | 25 | 793 | N/A | FDD | N/A |
|  | n78 | 3380 | 10 | 50 | 3380 | N/A | TDD | N/A |
|  | n41 | 2642 | 5 | 25 | 2642 | 29.5 | TDD | IMD2 |
|  | n41 | 2642 | 5 | 25 | 2642 | N/A | TDD | N/A |
|  | n78 | 3440 | 10 | 50 | 3440 | N/A | TDD | N/A |
|  | n28 | 743 | 5 | 25 | 798 | 30.8 | FDD | IMD21 |
|  | n41 | 2565 | 5 | 25 | 2565 | N/A | TDD | N/A |
|  | n28 | 745 | 5 | 25 | 800 | N/A | FDD | N/A |
|  | n78 | 3310 | 10 | 50 | 3310 | 29.7 | TDD | IMD22 |
| CA\_n39A-n40A-n79A | n39 | 1917.5 | 5 | 25 | 1917.5 | N/A | TDD | N/A |
|  | n40 | 2302.5 | 5 | 25 | 2302.5 | N/A | TDD | N/A |
|  | n79 | 4980 | 40 | 216 | 4980 | 5.8 | TDD | IMD4 |
| CA\_n40-n41-n79 | n40 | 2340 | 5 | 25 | 2340 | N/A | TDD | N/A |
|  | n41 | 2600 | 10 | 50 | 2600 | N/A | TDD | N/A |
|  | n79 | 4940 | 40 | 216 | 4940 | 30.5 | TDD | IMD2 |
| CA\_n41A-n66A-n77A  CA\_n41(2A)-n66A-n77A  CA\_n41C-n66A-n77A | n41 | 2560 | 5 | 25 | 2560 | N/A | TDD | N/A |
|  | n66 | 1730 | 5 | 25 | 2130 | N/A | FDD | N/A |
|  | n77 | 3390 | 10 | 50 | 3390 | 16.1 | TDD | IMD31,2 |
|  | n41 | 2670 | 5 | 25 | 2670 | 5.2 | TDD | IMD5 |
|  | n66 | 1715 | 5 | 25 | 2115 | N/A | FDD | N/A |
|  | n77 | 4190 | 10 | 50 | 4190 | N/A | TDD | N/A |
|  | n41 | 2530 | 5 | 25 | 2530 | N/A | TDD | N/A |
|  | n66 | 1760 | 5 | 25 | 2160 | 9.0 | FDD | IMD4 |
|  | n77 | 3610 | 10 | 50 | 3610 | N/A | TDD | N/A |
| CA\_n41A-n71A-n77A  CA\_n41(2A)-n71A-n77A  CA\_n41C-n71A-n77A | 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 |
|  | n41 | 2615 | 5 | 25 | 2615 | N/A | TDD | N/A |
|  | n71 | 693 | 5 | 25 | 647 | N/A | FDD | N/A |
|  | n77 | 4001 | 10 | 50 | 4001 | 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 |
|  | n41 | 2615 | 5 | 25 | 2615 | 28.7 | TDD | IMD2 |
|  | n71 | 693 | 5 | 25 | 647 | N/A | FDD | N/A |
|  | n77 | 3308 | 10 | 50 | 3308 | N/A | TDD | N/A |
|  | n41 | 2615 | 5 | 25 | 2615 | 15.5 | TDD | IMD3 |
|  | n71 | 693 | 5 | 25 | 647 | N/A | FDD | N/A |
|  | n77 | 4001 | 10 | 50 | 4001 | N/A | TDD | N/A |
|  | 41 | 2642 | 5 | 25 | 2642 | N/A | TDD | N/A |
|  | n71 | 743 | 5 | 25 | 798 | 30.8 | FDD | IMD2 |
|  | n77 | 3440 | 10 | 50 | 3440 | N/A | TDD | N/A |
| CA\_n66A-n71A-n77A | n66 | 1720 | 5 | 25 | 2120 | N/A | FDD | N/A |
|  | n71 | 668 | 5 | 25 | 622 | N/A | FDD | N/A |
|  | n77 | 4108 | 10 | 50 | 4108 | 15.9 | TDD | IMD31,2 |
|  | n66 | 1760 | 5 | 25 | 2160 | 15.5 | FDD | IMD32 |
|  | n71 | 693 | 5 | 25 | 647 | N/A | FDD | N/A |
|  | n77 | 3546 | 10 | 50 | 3546 | N/A | TDD | N/A |
|  | n66 | 1720 | 5 | 25 | 2120 | N/A | FDD | N/A |
|  | n71 | 686 | 5 | 25 | 640 | 15.3 | FDD | IMD3 |
|  | n77 | 4080 | 10 | 50 | 4080 | 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.  NOTE 3: The requirements only apply for UEs supporting inter-band carrier aggregation with simultaneous Rx/Tx capability. Simultaneous Rx/Tx capability does not apply for UEs supporting band n78 with a n77 implementation. | | | | | | | | |

### 7.3A.6 Reference sensitivity exceptions due to cross band isolation for CA

Sensitivity degradation is allowed for a band if it is impacted by UL of another band part of the same NR CA configuration due to cross band isolation issues. Reference sensitivity exceptions for the victim band are specified in Table 7.3A.6-1 with uplink configuration of the agressor band specified in Table 7.3A.6-2.

Table 7.3A.6-1: Reference sensitivity exceptions (MSD) due to cross band isolation for NR CA FR1

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR Band / Channel bandwidth of the affected DL band | | | | | | | | | | | | | | |
| UL band | DL band | 5 MHz (dB) | 10 MHz (dB) | 15 MHz (dB) | 20 MHz (dB) | 25 MHz (dB) | 30 MHz (dB) | 40 MHz (dB) | 50 MHz (dB) | 60 MHz (dB) | 70  MHz  (dB) | 80 MHz (dB) | 90 MHz (dB) | 100 MHz (dB) |
| n1 | n3 | 3 | 2.2 | 1.9 | 1.7 | 1.6 | 1.5 | 1.4 |  |  |  |  |  |  |
| n1 | n40 | 6.6 | 6.6 | 6.6 | 6.6 | 6.6 | 6.6 | 6.6 | 6.6 | 6.6 | 6.6 | 6.6 | 6.6 | 6.6 |
| n1 | n41 |  | 6.1 | 6.1 | 6.1 |  | 6.1 | 6.1 | 6.1 | 6.1 | 6.1 | 6.1 | 6.1 | 6.1 |
| n3 | n41 |  | 0.7 | 0.7 | 0.7 |  | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 |
| n38 | n78 |  | 8.3 | 8.3 | 8.3 | 7.3 | 6.5 | 6.3 | 5.3 | 4.5 | 4.3 | 4.0 | 3.9 | 3.8 |
| n40 | n1 | 8.3 | 8.3 | 8.3 | 8.3 | 8.3 | 8.3 | 8.3 | 8.3 |  |  |  |  |  |
| n41 | n1 | 9.1 | 9.1 | 9.1 | 9.1 | 9.1 | 9.1 | 9.1 | 9.1 |  |  |  |  |  |
| n41 | n3 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 |  |  |  |  |  |  |
| n7 | n3 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 |  |  |  |  |  |  |
| n41 | n25 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 |  |  |  |  |  |  |
| n38 | n25 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 |  |  |  |  |  |  |
| n411 | n66 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |  |  |  |  |  |  |
| n41 | n77 |  | 8.3 | 8.3 | 8.3 | 7.3 | 6.5 | 6.3 | 5.3 | 4.5 | 4.3 | 4.0 | 3.9 | 3.8 |
| n41 | n78 |  | 8.3 | 8.3 | 8.3 | 7.3 | 6.5 | 6.3 | 5.3 | 4.5 | 4.3 | 4.0 | 3.9 | 3.8 |
| n78 | n71 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 |  |  |  |  |  |
| n78 | n38 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 |  |  |  |  |  |  |
| n78 | n401 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 |
| n78 | n411 |  | 4.5 | 4.5 | 4.5 |  | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 |
| n783 | n79 |  |  |  |  |  |  | 2 | 2 | 2 |  | 2 |  | 2 |
| n79 | n783 |  | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 |
| NOTE 1: Applicable only when harmonic mixing MSD for this combination is not applied.  NOTE 2: Void  NOTE 3: The requirements only apply for UEs supporting inter-band carrier aggregation with simultaneous Rx/Tx capability. Simultaneous Rx/Tx capability does not apply for UEs supporting band n78 with a n77 implementation.  NOTE 4: 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. | | | | | | | | | | | | | | |

Table 7.3A.6.2: Uplink configuration for reference sensitivity exceptions due to cross band isolation for NR CA FR1

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR Band / SCS / Channel bandwidth of the affected DL band | | | | | | | | | | | | | | | |
| UL band | DL band | SCS of UL band (kHz) | 5 MHz | 10 MHz | 15 MHz | 20 MHz | 25 MHz | 30 MHz | 40 MHz | 50 MHz | 60 MHz | 70  MHz | 80 MHz | 90 MHz | 100 MHz |
| n1 | n3 | 15 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |  |  |  |  |  |  |
| n1 | n40 | 15 | 25 | 50 | 75 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| n1 | n41 | 15 |  | 100 | 100 | 100 |  | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| n3 | n41 | 15 |  | 50 | 50 | 50 |  | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| n38 | n78 | 15 |  | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| n40 | n1 | 30 | 25 | 50 | 75 | 100 | 100 | 100 | 100 | 100 |  |  |  |  |  |
| n41 | n1 | 30 | 128 | 128 | 128 | 128 | 128 | 128 | 128 | 128 |  |  |  |  |  |
| n41 | n3 | 30 | 160 | 160 | 160 | 160 | 160 | 160 | 160 |  |  |  |  |  |  |
| n7 | n3 | 15 | 270 | 270 | 270 | 270 | 270 | 270 | 270 |  |  |  |  |  |  |
| n41 | n25 | 15 | 160 | 160 | 160 | 160 | 160 | 160 | 160 |  |  |  |  |  |  |
| n38 | n25 | 15 | 160 | 160 | 160 | 160 | 160 | 160 | 160 |  |  |  |  |  |  |
| n41 | n66 | 30 | 128 | 128 | 128 | 128 | 128 | 128 | 128 |  |  |  |  |  |  |
| n41 | n77 | 15 |  | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| n41 | n78 | 15 |  | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| n78 | n7 | 30 | 270 | 270 | 270 | 270 | 270 | 270 | 270 | 270 |  |  |  |  |  |
| n78 | n38 | 30 | 270 | 270 | 270 | 270 | 270 | 270 | 270 |  |  |  |  |  |  |
| n78 | n40 | 30 | 270 | 270 | 270 | 270 | 270 | 270 | 270 | 270 | 270 | 270 | 270 | 270 | 270 |
| n78 | n41 | 30 |  | 270 | 270 | 270 |  | 270 | 270 | 270 | 270 | 270 | 270 | 270 | 270 |
| n783 | n79 | 30 |  |  |  |  |  | 270 | 270 | 270 | 270 |  | 270 |  | 270 |
| n79 | n783 | 30 |  | 270 | 270 | 270 | 270 | 270 | 270 | 270 | 270 | 270 | 270 | 270 | 270 |
| NOTE 1: The UL configuration applies regardless of the channel bandwidth of the UL band unless the UL resource blocks exceed that specified in Table 7.3.2-3 for the uplink bandwidth in which case the allocation according to Table 7.3.2-3 applies.  NOTE 2: Refers to the UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth in Table 5.3.2-1.  NOTE 3: The requirements only apply for UEs supporting inter-band carrier aggregation with simultaneous Rx/Tx capability. Simultaneous Rx/Tx capability does not apply for UEs supporting band n78 with a n77 implementation. | | | | | | | | | | | | | | | |

## 7.3B Reference sensitivity for NR-DC

For inter-band NR-DC configurations, the reference sensitivity for the corresponding inter-band CA configuration as specified in clause 7.3A applies.

## 7.3C Reference sensitivity for SUL

### 7.3C.1 General

The reference sensitivity power level REFSENS is the minimum mean power applied to each one of the UE antenna ports for all UE categories, at which the throughput shall meet or exceed the requirements for the specified reference measurement channel.

### 7.3C.2 Reference sensitivity power level for SUL

For SUL operation, the reference receive sensitivity (REFSENS) requirement for downlink bands specified in Table 7.3.2-1 and Table 7.3.2-2 shall be met for an uplink transmission bandwidth less than or equal to that specified in Table 7.3.2-3 or supplementary uplink transmission bandwidth less than or equal to that specified in Table 7.3C.2-1 with reference measurement channels as specified in Annexes A.2.2.2, A.2.3.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1), unless sensitivity degradation is allowed in this clause of this specification. These exceptions also apply to any higher order CA or DC combination containing one of the exception combinations in this clause as subset.

For SUL operation with downlink CA, the reference receive sensitivity (REFSENS) requirement for downlink bands specified in clause 7.3A.2 shall be met for an uplink transmission bandwidth less than or equal to that specified in Table 7.3.2-3 or supplementary uplink transmission bandwidth less than or equal to that specified in Table 7.3C.2-1 with reference measurement channels as specified in Annexes A.2.2.2, A.2.3.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1), unless sensitivity degradation is allowed in this clause of this specification. These exceptions also apply to any higher order CA or DC combination containing one of the exception combinations in this clause as subset.

Table 7.3C.2-1: Supplementary uplink configuration for reference sensitivity

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR Band / SCS of SUL band / Channel bandwidth of the DL band / NRB | | | | | | | | | | | | | | | |
| DL band | SUL band | SCS of SUL band  (kHz) | 5  MHz | 10 MHz | 15 MHz | 20 MHz | 25 MHz | 30 MHz | 40 MHz | 50 MHz | 60 MHz |  | 80 MHz | 90 MHz | 100 MHz |
| n1 | n80 | 15 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 |  |  |  |  |  |
| n1 | n841 | 15 | 25 | 50 | 75 | 100 | 128 | 128 | 128 | 128 |  |  |  |  |  |
| n28 | n831 | 15 | 25 | 25 | 25 | 25 |  | 25 |  |  |  |  |  |  |  |
| n41 | n80 | 15 |  | 160 | 160 | 160 |  | 160 | 160 | 160 | 160 |  | 160 | 160 | 160 |
| n41 | n81 | 15 |  | 100 | 100 | 100 |  | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| n41 | n83 | 15 |  | 100 | 100 | 100 |  | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
|  |  | 30 |  | 50 | 50 | 50 |  | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| n41 | n95 | 15 |  | 75 | 75 | 75 |  | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 |
| n77 | n80 | 15 |  | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 |
| n77 | n84 | 15 |  | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| n78 | n80 | 15 |  | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 |
| n78 | n81 | 15 |  | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| n78 | n82 | 15 |  | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| n78 | n83 | 15 |  | 100 | 100 | 100 | 160 | 160 | 100 | 100 | 100 | 160 | 100 | 100 | 100 |
| n78 | n84 | 15 |  | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| n78 | n86 | 15 |  | 216 | 216 | 216 | 216 | 216 | 216 | 216 | 216 | 216 | 216 | 216 | 216 |
| n79 | n80 | 15 |  |  |  |  |  |  | 160 | 160 | 160 |  | 160 |  | 160 |
| n79 | n83 | 15 |  |  |  |  |  |  | 100 | 100 | 100 |  | 100 |  | 100 |
|  |  | 30 |  |  |  |  |  |  | 50 | 50 | 50 |  | 50 |  | 50 |
| n79 | n81 | 15 |  |  |  |  |  |  | 100 | 100 | 100 |  | 100 |  | 100 |
| n79 | n84 | 15 |  |  |  |  |  |  | 100 | 100 | 100 |  | 100 |  | 100 |
| n79 | n95 | 15 |  |  |  |  |  |  | 75 | 75 | 75 |  | 75 |  | 75 |
| NOTE 1: The Tx-Rx carrier center frequency separation between SUL band and DL band is the same as the Tx-Rx carrier center frequency separation of DL band specified in table 5.4.4-1 from TS 38.101-1. The channel bandwidth of SUL band is the same as DL band. | | | | | | | | | | | | | | | |

For the UE that supports any of the SUL operation given in Table 7.3C.2-2, exceptions to the requirements specified in Table 7.3.2-1are allowed when the uplink is active in a lower frequency band and is within a specified frequency range such that transmitter harmonics fall within the downlink transmission bandwidth assigned in a higher band as noted in Table 7.3C.2-2. For these exceptions, the UE shall meet the requirements specified in Table 7.3C.2-2 and Table 7.3C.2-3.

Table 7.3C.2-2: Reference sensitivity for SUL operation (exceptions due to harmonic issue)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | NR Band / Channel bandwidth of the high band | | | | | | | | | | | | | |
| UL band | DL band | 5 MHz | 10 MHz | 15 MHz | 20 MHz | 25 MHz | 30 MHz | 40 MHz | 50 MHz | 60 MHz | 70 MHz | 80 MHz | 90 MHz | 100 MHz |
| dB | dB | dB | dB | dB | dB | dB | dB | dB | dB | dB | dB | dB |
| n80 | n771,2 |  | 23.9 | 22.1 | 20.9 | 19.8 | 19.0 | 17.9 | 16.8 | 16.0 | 15.4 | 14.8 | 14.3 | 13.8 |
|  | n773 |  | 1.1 | 0.8 | 0.3 |  |  |  |  |  |  |  |  |  |
| n80 | n781,2 |  | 23.9 | 22.1 | 20.9 | 19.8 | 19.0 | 17.9 | 16.8 | 16.0 | 15.4 | 14.8 | 14.3 | 13.8 |
|  | n783 |  | 1.1 | 0.8 | 0.3 |  |  |  |  |  |  |  |  |  |
| n81 | n418,9 |  | 13 | 11.3 | 10.1 |  | 8.3 | 7.0 | 6.1 | 5.5 | 4.9 | 4.3 | 3.9 | 3.5 |
|  | n784,5 |  | 10.8 | 9.1 | 8 | 7.2 | 6.5 | 5.1 | 4.2 | 3.5 | 2.9 | 2.3 | 1.5 | 1.4 |
|  | n796,7 |  |  |  |  |  |  | 6.8 | 6.2 | 5.6 |  | 4.9 |  | 4.4 |
| n82 | n784,5 |  | 10.8 | 9.1 | 8 | 7.4 | 6.8 | 6 | 4.0 | 3.2 | 2.6 | 2.0 | 1.5 | 1.0 |
| n83 | n786,7 |  | 10.4 | 8.9 | 7.8 | 6.8 | 5.8 | 4.7 | 3.7 | 3 | 2.4 | 1.7 | 1.2 | 0.7 |
| n84 | n771,2 |  | 23.9 | 22.1 | 20.9 | 19.8 | 19.0 | 17.9 | 16.8 | 16.0 | 15.4 | 14.8 | 14.3 | 13.8 |
|  | n773 |  | 1.1 | 0.8 | 0.3 |  |  |  |  |  |  |  |  |  |
| n86 | n781,2 |  | 23.9 | 22.1 | 20.9 | 19.8 | 19.0 | 17.9 | 16.8 | 16.0 | 15.4 | 14.8 | 14.3 | 13.8 |
|  | n783 |  | 1.1 | 0.8 | 0.3 |  |  |  |  |  |  |  |  |  |
|  | NOTE 1: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the aggressor (lower) band for which the 2nd transmitter harmonic is within the downlink transmission bandwidth of a victim (higher) band and a range ∆FHD above and below the edge of this downlink transmission bandwidth. The value ∆FHD depends on the band combination: ∆FHD = 10 MHz for SUL\_n78-n80, SUL\_n78-n86.  NOTE 2: The requirements should be verified for UL EARFCN of the aggressor (lower) band (superscript LB) such that in MHz and  with carrier frequency in the victim (higher) band in MHz and  the channel bandwidth configured in the lower band.  NOTE 3: The requirements are only applicable to channel bandwidths no larger than 20 MHz and with a carrier frequency at  MHz offset from  in the victim (higher band) with , whereandare the channel bandwidths configured in the aggressor (lower) and victim (higher) bands in MHz, respectively.  NOTE 4: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the aggressor (lower) band for which the 4th transmitter harmonic is within the downlink transmission bandwidth of a victim (higher) band.  NOTE 5: The requirements should be verified for UL EARFCN of the aggressor (lower) band (superscript LB) such that in MHz and  with carrier frequency in the victim (higher) band in MHz and  the channel bandwidth configured in the lower band.  NOTE 6: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the aggressor (lower) band for which the 5th transmitter harmonic is within the downlink transmission bandwidth of a victim (higher) band.  NOTE 7: The requirements should be verified for UL NR-ARFCN of the aggressor (lower) band (superscript LB) such that in MHz and  with carrier frequency in the victim (higher) band in MHz and  the channel bandwidth configured in the lower band.  NOTE 8: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the aggressor (lower) for which the 3rd transmitter harmonic is within the downlink transmission bandwidth of a victim (higher) band.  NOTE 9 The requirements should be verified for UL EARFCN of the aggressor (lower) band (superscript LBsuch that  in MHz and  with the carrier frequency in the victim (higher) band in MHz and the channel bandwidth configured in the low band. | | | | | | | | | | | | | |

Table 7.3C.2-3: Supplementary uplink configuration (exceptions due to harmonic issue)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | NR Band / Channel bandwidth of the high band | | | | | | | | | | | | | | |
| UL band | | DL band | 5 MHz (NRB) | 10 MHz (NRB) | 15 MHz (NRB) | 20 MHz (NRB) | 25 MHz (NRB) | 30 MHz (NRB) | 40 MHz (NRB) | 50 MHz (NRB) | 60 MHz (NRB) | 70 MHz (NRB) | 80 MHz (NRB) | 90 MHz (NRB) | 100 MHz (NRB) |
| n80 | | n77 |  | 25 | 36 | 50 |  |  | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| n80 | | n78 |  | 25 | 36 | 50 |  |  | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| n81 | | n41 |  | 16 | 25 | 25 |  |  | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| n81 | | n78 |  | 16 | 25 | 25 |  |  | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| n81 | | n79 |  |  |  |  |  |  | 25 | 25 | 25 |  | 25 |  | 25 |
| n82 | | n78 |  | 16 | 20 | 20 |  |  | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| n83 | | n78 |  | 10 | 15 | 20 |  |  | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| n84 | | n77 |  | 25 | 36 | 50 |  |  | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| n86 | | n78 |  | 25 | 36 | 50 |  |  | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
|  | NOTE 1: 15 kHz SCS is assumed for UL band.  NOTE 2: The UL configuration applies regardless of the channel bandwidth of the low band  NOTE 3: Unless stated otherwise, UL resource blocks shall be centered within the transmission bandwidth configuration for the channel bandwidth. | | | | | | | | | | | | | | |

Sensitivity degradation is allowed for a band if it is impacted by UL of another band part of the same SUL configuration due to cross band isolation issues. Reference sensitivity exceptions are specified in Table 7.3C.2-4 with uplink configuration specified in Table 7.3C.2-5.

Table 7.3C.2-4: Reference sensitivity exceptions due to cross band isolation

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| UL band | DL band | 5 MHz  (dBm) | 10 MHz  (dBm) | 15 MHz  (dBm) | 20 MHz  (dBm) | 25 MHz  (dBm) | 30 MHz  (dBm) | 40 MHz  (dBm) | 50 MHz  (dBm) | 60 MHz  (dBm) | 70 MHz  (dBm) | 80 MHz  (dBm) | 90 MHz  (dBm) | 100 MHz  (dBm) |
| n80 | n41 |  | 4.3 | 4.0 | 3.9 |  | 3.9 | 3.9 | 3.5 | 3.3 | 3.3 | 3.2 | 3.1 | 3.0 |
| n95 | n41 |  | 6.1 | 6.1 | 6.1 |  | 6.1 | 6.1 | 6.1 | 6.1 | 6.1 | 6.1 | 6.1 | 6.1 |
|  | NOTE 1: The B41 requirements are modified by -0.5dB when carrier frequency of the assigned E-UTRA channel bandwidth is within 2515 – 2690 MHz. | | | | | | | | | | | | | |

Table 7.3C.2-5: Uplink configuration for reference sensitivity exceptions due to cross band isolation

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| UL band | DL band | 5 MHz  (dBm) | 10 MHz  (dBm) | 15 MHz  (dBm) | 20 MHz  (dBm) | 25 MHz  (dBm) | 30 MHz  (dBm) | 40 MHz  (dBm) | 50 MHz  (dBm) | 60 MHz  (dBm) | 70 MHz  (dBm | 80 MHz  (dBm) | 90 MHz  (dBm) | 100 MHz  (dBm) |
| n80 | n41 |  | 50 | 50 | 50 |  | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| n95 | n41 |  | 75 | 75 | 75 |  | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 |
|  | NOTE: 15 kHz SCS is assumed for UL band. | | | | | | | | | | | | | |

### 7.3C.3 ΔRIB,c for SUL

#### 7.3C.3.1 General

For a UE supporting a SUL configuration, the ΔRIB,c applies for both SC and SUL operation.

#### 7.3C.3.2 SUL band combination

For the UE which supports SUL band combiantion, the minimum requirement for reference sensitivity in clause 7.3C.2 shall be increased by the amount given in ΔRIB,c defined in clause 7.3C.3.2 for the applicable operating bands. Unless otherwise stated, ΔRIB,c is set to zero.

In case the UE supports more than one of band combinations for CA, SUL or DC, and an operating band belongs to more than one band combinations then

- When the operating band frequency range is ≤ 1 GHz, the applicable additional ΔRIB,c shall be the average value for all band combinations defined in clause 7.3A, 7.3B, 7.3C in this specification and 7.3A, 7.3B in TS 38.101-3 [3], truncated to one decimal place that apply for that operating band among the supported band combinations. In case there is a harmonic relation between low band UL and high band DL, then the maximum ΔRIB,c among the different supported band combinations involving such band shall be applied

- When the operating band frequency range is > 1 GHz, the applicable additional ΔRIB,c shall be the maximum value for all band combinations defined in clause 7.3A, 7.3B, 7.3C in this specification and 7.3A, 7.3B in TS 38.101-3 [3] for the applicable operating bands.

##### 7.3C.3.2.1 ΔRIB,c for two bands

Table 7.3C.3.2.1-1: ΔRIB,c due to SUL (two bands)

|  |  |  |
| --- | --- | --- |
| Band combination for SUL | NR Band | ΔRIB,c (dB) |
| SUL\_n41-n80 | n41 | 0.5 (note) |
| SUL\_n41-n95 | n41 | 0.2 |
| SUL\_n77-n80 | n77 | 0.5 |
| SUL\_n77-n84 | n77 | 0.5 |
| SUL\_n78-n80 | n78 | 0.5 |
| SUL\_n78-n81 | n78 | 0.5 |
| SUL\_n78-n82 | n78 | 0.5 |
| SUL\_n78-n83 | n78 | 0.5 |
| SUL\_n78-n84 | n78 | 0.5 |
| SUL\_n78-n86 | n78 | 0.5 |
| SUL\_n79-n83 | n79 | 0.5 |
| NOTE: The requirement is applied for UE transmitting on the frequency range of 2496 – 2515 MHz. | | |

##### 7.3C.3.2.2 ΔRIB,c for three bands

Table 7.3C.3.2.2-1: ΔRIB,c due to SUL (three bands)

|  |  |  |
| --- | --- | --- |
| Band combination for SUL | NR Band | ΔRIB,c (dB) |
| CA\_n1\_SUL\_n78-n80 | n1 | 0.2 |
|  | n78 | 0.5 |
| CA\_n1\_SUL\_n78-n84 | n1 | 0.2 |
|  | n78 | 0.5 |
| CA\_n28\_SUL\_n41-n83 | n28 | 0.2 |
| CA\_n28\_SUL\_n79-n83 | n28 | 0.2 |
|  | n79 | 0.5 |
| CA\_n41\_SUL\_n79-n80 | n41 | 0.5 |
|  | n79 | 0.5 |
| CA\_n79\_SUL\_n41-n80 | n41 | 0.5 |

## 7.3D Reference sensitivity for UL MIMO

For UE with two transmitter antenna connectors in closed-loop spatial multiplexing scheme, the minimum requirements specified in clause 7.3 shall be met with the UL MIMO configurations described in clause 6.2D.1 and the reference measurement channels as specified in Annexes A.2.2 and A.2.3 for CP-OFDM waveforms shall apply. For UL MIMO, the parameter PUMAX is the total transmitter power over the two transmits power over the two transmit antenna connectors.

## 7.3E Reference sensitivity for V2X

### 7.3E.1 General

The reference sensitivity power level PREFSENS\_V2X is the minimum mean power applied to each one of the UE antenna port for V2X UE, at which the throughput shall meet or exceed the requirements for the specified reference measurement channel.

### 7.3E.2 Minimum requirements

When UE is configured for NR V2X reception non-concurrent with NR uplink transmissions for NR V2X operating bands specified in Table 5.2E.1-1, the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.7.2 with parameters specified in Table 7.3E.2-1.

Table 7.3E.2-1: Reference sensitivity of NR V2X Bands (PC5)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | Channel bandwidth / PREFSENS\_V2X(dBm) | | | | |
| NR V2X Band | SCS kHz | 10 MHz | 20 MHz | 30 MHz | 40 MHz | Duplex Mode |
| n38 | 15 | -96.5 | -93.2 | -91.4 | -90.1 | HD |
|  | 30 | -96.1 | -93.4 | -91.7 | -90.2 | HD |
|  | 60 | -96.9 | -93.1 | -91.9 | -90.4 | HD |
| n47 | 15 | -92.5 | -89.2 | -87.4 | -86.1 | HD |
|  | 30 | -92.1 | -89.4 | -87.7 | -86.2 | HD |
|  | 60 | -92.9 | -89.1 | -87.9 | -86.4 | HD |
| NOTE 1: Reference measurement channel is defined in A.8.  NOTE 2: The signal power is specified per antenna port.  NOTE 3: Void. | | | | | | |

Table 7.3E.2-2: Sidelink TX configuration for reference sensitivity of NR V2X Bands (PC5)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| NR Band / SCS / Channel bandwidth / Duplex mode | | | | | | |
| NR V2X Band | SCS  kHz | 10 MHz | 20 MHz | 30 MHz | 40 MHz | Duplex Mode |
| n38 | 15 | 50 | 105 | 160 | 216 | HD |
|  | 30 | 24 | 50 | 75 | 105 | HD |
|  | 60 | 102 | 24 | 36 | 50 | HD |
| n47 | 15 | 50 | 105 | 160 | 216 | HD |
|  | 30 | 24 | 50 | 75 | 105 | HD |
|  | 60 | 102 | 24 | 36 | 50 | HD |
| NOTE 1: The sidelink allocated RB (LCRB) size could be adjusted according to resource pool configuration in [7].  NOTE 2: For the case, 11 RB is allowed for S-SS/PSBCH Block. | | | | | | |

### 7.3E.3 Reference sensitivity power level for V2X con-current operation

When UE is configured for NR V2X reception on V2X carrier con-current with NR uplink and downlink, NR V2X sidelink throughput for the carrier shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes 8.2 with parameters specified in Table 7.3E.3-1. Also the NR downlink throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.3.

For the inter-band con-current NR V2X operation, and the UE also supports an NR downlink inter-band con-current configuration in Table 7.3E.3-2, the minimum requirement for reference sensitivity shall be increased by the amount given in ΔRIB,c in Table 7.3E.3-2 for the corresponding NR V2X inter-band combinations.

Table 7.3E.3-1: Reference sensitivity for V2X Communication QPSK PREFSENS

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Inter-band V2X reception | | Channel bandwidth | | | | | | | | | | | | |
| NR V2X Band | NR band | NR Band | SCS (kHz) | 5 MHz  (dBm) | 10 MHz  (dBm) | 15 MHz  (dBm) | 20 MHz  (dBm) | 25 MHz  (dBm) | 30 MHz  (dBm) | 40 MHz (dBm) | 50 MHz (dBm) | 60 MHz (dBm) | 80 MHz (dBm) | Duplex Mode |
| n47 | n39 | n39 | 15 | -100.0 | -96.8 | -95.0 | -93.8 | -92.7 | -91.9 | -90.6 |  |  |  | TDD |
|  |  |  | 30 |  | -97.1 | -95.1 | -94.0 | -92.8 | -92.0 | -90.7 |  |  |  |  |
|  |  |  | 60 |  | -97.5 | -95.4 | -94.2 | -93.0 | -92.1 | -90.9 |  |  |  |  |
|  |  | n47 | 15 |  | -92.5 |  | -89.2 |  | -87.4 | -86.1 |  |  |  | HD |
|  |  |  | 30 |  | -92.1 |  | -89.4 |  | -87.7 | -86.2 |  |  |  |  |
|  |  |  | 60 |  | -92.9 |  | -89.1 |  | -87.9 | -86.4 |  |  |  |  |
| n47 | n40 | n40 | 15 | -100.0 | -96.8 | -95.0 | -93.8 | -92.7 | -91.9 | -90.6 | -89.6 |  |  | TDD |
|  |  |  | 30 |  | -97.1 | -95.1 | -94.0 | -92.8 | -92.0 | -90.7 | -89.7 | -88.9 | -87.6 |  |
|  |  |  | 60 |  | -97.5 | -95.4 | -94.2 | -93.0 | -92.1 | -90.9 | -89.8 | -89.1 | -87.6 |  |
|  |  | n47 | 15 |  | -92.5 |  | -89.2 |  | -87.4 | -86.1 |  |  |  | HD |
|  |  |  | 30 |  | -92.1 |  | -89.4 |  | -87.7 | -86.2 |  |  |  |  |
|  |  |  | 60 |  | -92.9 |  | -89.1 |  | -87.9 | -86.4 |  |  |  |  |
| n47 | n71 | n71 | 15 | -97.2 | -94.0 | -91.6 | -86.0 |  |  |  |  |  |  | FDD |
|  |  |  | 30 |  | -94.3 | -91.9 | -87.4 |  |  |  |  |  |  |  |
|  |  |  | 60 |  |  |  |  |  |  |  |  |  |  |  |
|  |  | n47 | 15 |  | -92.5 |  | -89.2 |  | -87.4 | -86.1 |  |  |  | HD |
|  |  |  | 30 |  | -92.1 |  | -89.4 |  | -87.7 | -86.2 |  |  |  |  |
|  |  |  | 60 |  | -92.9 |  | -89.1 |  | -87.9 | -86.4 |  |  |  |  |
| NOTE 1: Reference measurement channel is defined in A.7.2.  NOTE 2: The signal power is specified per antenna port.  NOTE 3: Void. | | | | | | | | | | | | | | |

Table 7.3E.3-2: ΔRIB,V2X (two bands)

|  |  |  |
| --- | --- | --- |
| V2X inter-band con-current band Combination | NR Band | ΔRIB,V2X [dB] |
| V2X\_n71-n47 | n71 | 0.0 |

The reference sensitivity is defined to be met with NR uplink assigned to one band (that differs from the V2X operating band) and all NR downlink carriers active. The NR uplink resource blocks shall be located as close as possible to NR V2X operating band but confined within the transmission bandwidth configuration for the channel. The uplink configuration for the NR operating band is specified in Table 7.3E.3-3 and 7.3E.3-4. The REFSENS of Uu downlink and PC5 sidelink will be tested at the same time.

Table 7.3E.3-3: Uplink configuration for REFSENS of NR V2X Bands (PC5)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Inter-band NR V2X con-current band configuration | | NR UL band / SCS/ Channel BW / Duplex mode | | | | |
| NR V2X band (PC5) | NR V2X band (Uu) | NR V2X UL band (Uu) | SCS (kHz) | Channel Bandwidth (MHz) | NRB | Duplex Mode |
| n47 | n39 | n39 | 15 | 10 | 50 | TDD |
|  |  |  | 30 | 10 | 24 |  |
|  |  |  | 60 | 10 | 10 |  |
| n47 | n40 | n40 | 15 | 10 | 50 | TDD |
|  |  |  | 30 | 10 | 24 |  |
|  |  |  | 60 | 10 | 10 |  |
| n47 | n71 | n71 | 15 | 10 | 52 | FDD |
|  |  |  | 30 | 10 | 24 |  |
|  |  |  | 60 | 10 | 11 |  |

Table 7.3E.3-4: Sidelink TX configuration for REFSENS of NR V2X Bands (Uu)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Inter-band NR V2X con-current band configuration | | NR UL band / SCS/ Channel BW / Duplex mode | | | | |
| NR V2X band (PC5) | NR V2X band (Uu) | NR V2X band (PC5) | SCS (kHz) | Channel Bandwidth (MHz) | NRB | Duplex Mode |
| n47 | n39 | n47 | 15 | 10 | 50 | HD |
|  |  |  | 30 | 10 | 24 |  |
|  |  |  | 60 | 10 | 10 |  |
| n47 | n40 | n47 | 15 | 10 | 50 | HD |
|  |  |  | 30 | 10 | 24 |  |
|  |  |  | 60 | 10 | 10 |  |
| n47 | n71 | n47 | 15 | 10 | 50 | HD |
|  |  |  | 30 | 10 | 24 |  |
|  |  |  | 60 | 10 | 10 |  |
| NOTE 1: The sidelink allocated RB (LCRB) size could be adjusted according to resource pool configuration in [7]. | | | | | | |

clause

## 7.3F Reference sensitivity for shared spectrum channel access

### 7.3F.1 General

The reference sensitivity power level REFSENS is the minimum mean power applied to each one of the UE antenna ports, at which the throughput shall meet or exceed the requirements for the specified reference measurement channel.

In later clauses of Clause 7 where the value of REFSENS is used as a reference to set the corresponding requirement, the UE shall be verified against those requirements by applying the REFSENS value in Table 7.3G.2-1 with 2 Rx antenna ports tested.

### 7.3F.2 Reference sensitivity power level

The throughput shall be ≥ 95 % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2.2, A.2.3.2, A3.2 and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3F.2-1, Table 7.3F.2-2, and Table 7.3F.2-3.

Table 7.3F.2-1: Two antenna port reference sensitivity QPSK PREFSENS

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Operating band / SCS / Channel bandwidth | | | | | |
| Operating Band | SCS kHz | 20 MHz (dBm) | 40 MHz (dBm) | 60 MHz (dBm) | 80 MHz (dBm) |
| n46 | 15 | -89.7 | -86.6 |  |  |
|  | 30 | -89.9 | -86.7 | -84.8 | -83.6 |
|  | 60 | -90.1 | -86.9 | -85.0 | -83.6 |
| n96 | 15 | -89.2 | -86.1 |  |  |
|  | 30 | -89.4 | -86.2 | -84.3 | -83.1 |
|  | 60 | -89.6 | -86.4 | -84.5 | -83.1 |

For UE(s) equipped with 4 Rx antenna ports, reference sensitivity for 2Rx antenna ports in Table 7.3F.2-1 shall be modified by the amount given in ΔRIB,4R in Table 7.3F.2-2 for the applicable operating bands.

Table 7.3F.2-2: Four antenna port reference sensitivity allowance ΔRIB,4R

|  |  |
| --- | --- |
| Operating band | ΔRIB,4R (dB) |
| n46, n96 | -2.2 |

The reference receive sensitivity (REFSENS) requirement specified in Table 7.3F.2-1 and Table 7.3F.2-2 shall be met with uplink transmission bandwidth less than or equal to that specified in Table 7.3F.2-3.

Table 7.3F.2-3: Uplink configuration for reference sensitivity

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Operating band / SCS / Channel bandwidth | | | | | |
| Operating Band | SCS kHz | 20 MHz (dBm) | 40 MHz (dBm) | 60 MHz (dBm) | 80 MHz (dBm) |
| n46 | 15 | 100 | 216 |  |  |
|  | 30 | 50 | 100 | 162 | 216 |
|  | 60 | 24 | 50 | 75 | 100 |
| n96 | 15 | 100 | 216 |  |  |
|  | 30 | 50 | 100 | 162 | 216 |
|  | 60 | 24 | 50 | 75 | 100 |

Unless given by Table 7.3F.2-4, the minimum requirements specified in Tables 7.3F.2-1 and 7.3F.2-2 shall be verified with the network signalling value NS\_01 (Table 6.2F.3.1-1) configured.

Table 7.3F.2-4: Network signaling value for reference sensitivity

|  |  |
| --- | --- |
| Operating band | Network Signalling value |
| n46 | NS\_01 |
| n96 | NS\_53 |

### 7.3F.3 ΔRIB,c

For a UE supporting CA or DC band combination, the minimum requirement for reference sensitivity in Table 7.3F.2-1 shall be increased by the amount given by ΔRIB,c defined in Table 7.3F.3-1. Unless otherwise stated, ΔRIB,c is set to zero.

Table 7.3F.3-1: ΔRIB,c due to CA (two bands)

|  |  |  |
| --- | --- | --- |
| Inter-band CA combination | Operating Band | ΔRIB,c (dB) |
| CA\_n46-n48 | n46 | 0 |
|  | n48 | 0.5 |

In case the UE supports more than one of band combinations for CA or DC, and an operating band belongs to more than one band combinations then the applicable additional ΔRIB,c shall be the maximum value for all band combinations defined in clause 7.3A and 7.3F.3 in this specification and 7.3A, 7.3B in TS 38.101-3 [3] for the applicable operating bands.

### 7.3F.4 Intra-band contiguous shared spectrum channel access CA

For intra-band contiguous carrier aggregation, the throughput of each component carrier shall be ≥ 95 % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2.2, A.2.3.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3F.2-1, Table 7.3F.2-2, and Table 7.3F.2-3.

### 7.3G.5 Inter-band CA with shared spectrum channel access

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one NR band the throughput of the NR carrier shall be ≥ 95 % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2.2, A.2.3.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1 with parameters specified in Table 7.3.2-1, Table 7.3.2-2 and Table 7.3.2-3 modified in accordance with clause 7.3F.3. The throughput of the NR-U carrier shall be ≥ 95 % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2.2, A.2.3.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3F.2-1, Table 7.3F.2-2, and Table 7.3F.2-3 modified in accordance with clause 7.3F.3. The reference sensitivity is defined to be met with all downlink component carriers active and the PCell uplink carrier active. Exceptions to reference sensitivity are allowed in accordance with clause 7.3F.5.1 and clause 7.3F.5.2.

#### 7.3G.5.1 Reference sensitivity exceptions due to UL harmonic interference

The reference sensitivity for the shared access band does not apply when there is at least one individual RE within the shared access downlink transmission bandwidth which falls into the reference sensitivity exclusion region as specified in Table 7.3F.5.1-1.

Table 7.3F.5.1-1: NR-U reference sensitivity measurement exclusion region in MHz.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| NR Band / Harmonic order / Channel BW in UL | | | | | | |
| Band | Harmonic order | 5MHz | 10MHz | 15MHz | 20 MHz | 40MHz |
| n25 | 3 | +/- 15 | +/- 23 | +/- 35 | +/- 45 | +/- 90 |
| n66 | 3 | +/- 15 | +/- 23 | +/- 35 | +/- 45 | +/- 90 |
| NOTE 1: Even though UL harmonic does not fall directly into NR-U band the exclusion region still applies.  NOTE 2: The center of the exclusion region is obtained by multiplying the UL channel center frequency by the harmonic order. | | | | | | |

#### 7.3F.5.2 Reference sensitivity exceptions due to cross band isolation

For unsynchronized operation, Rx de-sensing in one band will be caused by another band due to lack of isolation in the band filters. Reference sensitivity exceptions for cross band are specified in Table 7.3F.5.2-1 with uplink configuration specified in Table 7.3F.5.2-2-2.

Table 7.3F.5.2-1: MSD for cross band isolation

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Operating Band / Channel bandwidth of the affected DL band | | | | | | | | | | | | | | | |
| CA Configuration | UL band | DL band | 5 MHz (dB) | 10 MHz (dB) | 15 MHz (dB) | 20 MHz (dB) | 25 MHz (dB) | 30 MHz (dB) | 40 MHz (dB) | 50 MHz (dB) | 60 MHz (dB) | 70 MHz (dB) | 80 MHz (dB) | 90 MHz (dB) | 100 MHz (dB) |
| CA\_n46A-n48A | n46 | n48 | 13.3 | 10.4 | 8.8 | 7.8 | - | - | 7.8 | 7 | 6.5 | 6.5x | 5.7 | 5.4 | 5.1 |
|  | n48 | n46 | - | - | - | 13.5 | - | - | 10.9 | - | 9.4 |  | 8.7 | - | - |
| NOTE x: This MSD value is a placeholder to enable BCS4 in this version of the spec. It will be updated based on contributions. | | | | | | | | | | | | | | | |

Table 7.3F.5.2-2: Uplink configuration for reference sensitivity exceptions due to cross band isolation

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Operating Band / SCS / Channel bandwidth of the affected DL band | | | | | | | | | | | | | | |
| UL band | DL band | SCS of UL band (kHz) | 5 MHz | 10 MHz | 15 MHz | 20 MHz | 25 MHz | 30 MHz | 40 MHz | 50 MHz | 60 MHz | 70 MHz | 80 MHz | 90 MHz | 100 MHz |
| n46 | n48 | 30 | 216 | 216 | 216 | 216 |  |  | 216 | 216 | 216 | 216 | 216 | 216 | 216 |
| n48 | n46 | 15 |  |  |  | 216 |  |  | 216 |  | 216 |  | 216 |  |  |
|  | NOTE 1: The UL configuration applies regardless of the channel bandwidth of the UL band unless the UL resource blocks exceed that specified in Table 7.3.2-3 for the uplink bandwidth in which case the allocation according to Table 7.3.2-3 applies.  NOTE 2: Refers to the UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth in Table 5.3.2-1. | | | | | | | | | | | | | | |

<End of Changes>