**3GPP TSG-RAN WG5 Meeting #105 *R5-247768***

**Orlando, United States, 18th Nov 2024 - 22nd Nov 2024**

|  |  |  |  |  |  |  |  |  |
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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.521-1** | **CR** | **3057** | **rev** | **1** | **Current version:** | **18.4.0** |  |
|  | | | | | | | | |
| *For* ***[HE](http://www.3gpp.org/3G_Specs/CRs.htm" \l "_blank)******[LP](http://www.3gpp.org/3G_Specs/CRs.htm" \l "_blank)*** *on using this form: comprehensive instructions can be found at  <http://www.3gpp.org/Change-Requests>.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network |  |

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|  | | | | | | | | | | |
| ***Title:*** | Update REFSENSE power level for n41 CBW 5MHz | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | CMCC | | | | | | | | | |
| ***Source to TSG:*** | R5 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | TEI17\_Test, NR\_lic\_bands\_BW\_R17-UEConTest | | | | |  | ***Date:*** | | | 2024-9-5 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-18 |
|  | *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-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | REFSENSE power level TCs need to be updated to add n41 CBW 5MHz as per WP. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | REFSENSE power level TCs have been updated for adding n41 CBW 5MHz. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The band can not be completed. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 7.3.2, 7.3A.1\_1, 7.3I.2, 7.3I.3 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |

<<< START OF CHANGES >>>

### 7.3.2 Reference sensitivity power level

7.3.2.1 Test purpose

The test purpose is to verify the ability of the UE to receive data with a given average throughput for a specified reference measurement channel, under conditions of low signal level, ideal propagation and no added noise.

7.3.2.2 Test applicability

This test case applies to all types of NR UE release 15 and forward that don’t support RedCap.

7.3.2.3 Minimum conformance requirements

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.

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, 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 7.3.2.3-1a, 7.3.2.3-1b, Table 7.3.2.3-1c, Table 7.3.2.3-1d and Table 7.3.2.3-2.

Table 7.3.2.3-1a: Two antenna port reference sensitivity QPSK PREFSENS for FDD bands

|  | Operating band / SCS / Channel bandwidth | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Operating Band | | SCS (kHz) | 3  MHz (dBm) | 5  MHz (dBm) | 10  MHz (dBm) | 15  MHz (dBm) | 20  MHz (dBm) | 25  MHz (dBm) | 30 MHz (dBm) | 35 MHz (dBm) | 40  MHz (dBm) | 45 MHz (dBm) | 50  MHz (dBm) |
| n1 | | 15 |  | -100.0 | -96.8 | -95.0 | -93.8 | -92.7 | -91.9 |  | -90.6 | -90.1 | -89.6 |
| 30 |  |  | -97.1 | -95.1 | -94.0 | -92.8 | -92.0 |  | -90.7 | -90.2 | -89.7 |
| 60 |  |  | -97.5 | -95.4 | -94.2 | -93.0 | -92.1 |  | -90.9 | -90.3 | -89.7 |
| n2 | | 15 |  | -98 | -94.8 | -93 | -91.8 | -90.7 | -84.1 |  | -81.5 |  |  |
| 30 |  |  | -95.1 | -93.1 | -92 | -90.8 | -84.2 |  | -81.6 |  |  |
| 60 |  |  | -95.5 | -93.4 | -92.2 | -90.9 | -84.3 |  | -81.7 |  |  |
| n3 | | 15 |  | -97.0 | -93.8 | -92.0 | -90.8 | -89.7 | -88.9 | -86.2 | -82.3 | -81.3 | -79.7 |
| 30 |  |  | -94.1 | -92.1 | -91.0 | -89.8 | -89.0 | -86.3 | -82.4 | -81.4 | -79.8 |
| 60 |  |  | -94.5 | -92.4 | -91.2 | -90.0 | -89.1 | -86.4 | -82.6 | -81.5 | -79.9 |
| n5 | | 15 |  | -98.0 | -94.8 | -93.0 | -86.8 | -84.8 |  |  |  |  |  |
| 30 |  |  | -95.1 | -93.1 | -88.6 | -84.9 |  |  |  |  |  |
| n71 | | 15 |  | -98.0 | -94.8 | -93.0 | -91.8 | -90.7 | -89.9 |  | -88.6 |  | -81.5 |
| 30 |  |  | -95.1 | -93.1 | -92.0 | -90.8 | -90.0 |  | -88.7 |  | -81.5 |
| 60 |  |  | -95.5 | -93.4 | -92.2 | -91.0 | -90.1 |  | -88.9 |  | -81.5 |
| n8 | | 15 |  | -97.0 | -93.8 | -91.4 | -85.8 |  |  | -78.4 |  |  |  |
| 30 |  |  | -94.1 | -91.7 | -87.2 |  |  | -78.5 |  |  |  |
| n12 | | 15 |  | -97.0 | -93.8 | -84.0 |  |  |  |  |  |  |  |
| 30 |  |  | -94.1 | -84.1 |  |  |  |  |  |  |  |
| n13 | | 15 |  | -97.0 | -93.8 |  |  |  |  |  |  |  |  |
| 30 |  |  | -94.1 |  |  |  |  |  |  |  |  |
| n14 | | 15 |  | -97.0 | -93.8 |  |  |  |  |  |  |  |  |
| 30 |  |  | -94.1 |  |  |  |  |  |  |  |  |
| n20 | | 15 |  | -97.0 | -93.8 | -91.0 | -89.8 |  |  |  |  |  |  |
| 30 |  |  | -94.1 | -91.1 | -90.0 |  |  |  |  |  |  |
| n24 | | 15 |  | -100.0 | -96.8 |  |  |  |  |  |  |  |  |
| 30 |  |  | -97.1 |  |  |  |  |  |  |  |  |
| 60 |  |  | -97.5 |  |  |  |  |  |  |  |  |
| n25 | | 15 |  | -96.5 | -93.3 | -91.5 | -90.3 | -89.3 | -82.2 | -81.7 | -79.5 | -77.6 |  |
| 30 |  |  | -93.6 | -91.6 | -90.5 | -89.4 | -82.3 | -81.8 | -79.6 | -77.7 |  |
| 60 |  |  | -94.0 | -91.9 | -90.7 | -89.6 | -82.4 | -81.9 | -79.7 | -77.8 |  |
| n26 | | 15 | -99.7 | -97.56 | -94.56 | -92.76 | -87.6 |  |  |  |  |  |  |
| 30 |  |  | -94.86 | -92.76 | -87.7 |  |  |  |  |  |  |
| n28 | | 15 | -100.2 | -98.5 | -95.5 | -93.5 | -90.8 |  | -78.5 |  |  |  |  |
| 30 |  |  | -95.6 | -93.6 | -91.0 |  | -78.6 |  |  |  |  |
| n30 | | 15 |  | -99.0 | -95.8 |  |  |  |  |  |  |  |  |
| 30 |  |  | -96.1 |  |  |  |  |  |  |  |  |
| n65 | | 15 |  | -99.5 | -96.3 | -94.5 | -93.3 |  |  |  |  |  | -89.2 |
| 30 |  |  | -96.6 | -94.6 | -93.5 |  |  |  |  |  | -89.3 |
| 60 |  |  | -97.0 | -94.9 | -93.7 |  |  |  |  |  | -89.4 |
| n66 | | 15 |  | -99.5 | -96.3 | -94.5 | -93.3 | -92.2 | -91.4 |  | -90.1 | -89.6 |  |
| 30 |  |  | -96.6 | -94.6 | -93.5 | -92.3 | -91.5 |  | -90.2 | -89.7 |  |
| 60 |  |  | -97.0 | -94.9 | -93.7 | -92.5 | -91.6 |  | -90.4 | -89.8 |  |
|  | | 15 |  | -100.0 | -96.8 | -95.0 | -93.8 | -92.7 |  |  |  |  |  |
| n70 | | 30 |  |  | -97.1 | -95.1 | -94.0 | -92.8 |  |  |  |  |  |
|  | | 60 |  |  | -97.5 | -95.4 | -94.2 | -93.0 |  |  |  |  |  |
| n71 | | 15 |  | -97.2 | -94.0 | -91.6 | -86.0 | -84.18  -74.89 | -82.58  -67.19 | -80.78  -64.09 |  |  |  |
| 30 |  |  | -94.3 | -91.9 | -87.4 | -84.28  -74.99 | -82.68  -67.29 | -80.88  -64.19 |  |  |  |
| n74 | | 15 |  | -99.53 | -96.33 | -94.53 | -89.33 |  |  |  |  |  |  |
| 30 |  |  | -96.63 | -94.63 | -89.53 |  |  |  |  |  |  |
| 60 |  |  | -97.03 | -94.93 | -89.63 |  |  |  |  |  |  |
| n85 | | 15 | -99.2 | -97.0 | -93.8 | -84.0 |  |  |  |  |  |  |  |
| 30 |  |  | -94.1 | -84.1 |  |  |  |  |  |  |  |
| n100 | | 15 | -102.2 | -100 |  |  |  |  |  |  |  |  |  |
| n106 | | 15 | -99.2 |  |  |  |  |  |  |  |  |  |  |
| NOTE 1: Four Rx antenna ports shall be the baseline for this operating band except for two Rx vehicular UE. Four Rx antenna ports for RedCap UE is not supported for this operating band.  NOTE 2: The transmitter shall be set to PUMAX as defined in clause 6.2.4  NOTE 3: The requirement is modified by -0.5 dB when the assigned NR channel bandwidth is confined within 1475.9 - 1510.9 MHz.  NOTE 4: Void  NOTE 5: Void  NOTE 6: Values are modified by -0.5dB when carrier channel BW is between 865MHz and 894MHz.  NOTE 7: Void.  NOTE 8: Applies to UEs that support a maximum uplink BW of 20 MHz in this band.  NOTE 9: Applies to UEs that support optional symmetric UL/DL for this BW. | | | | | | | | | | | | | |

Table 7.3.2.3-1b: Two antenna port reference sensitivity QPSK PREFSENS for TDD, SDL and FDD with variable duplex operation bands

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Operating band / SCS / Channel bandwidth / REFSENS | | | | |
| Operating band | SCS  (kHz) | Channel bandwidth (MHz) | REFSENS (dBm)8 | Duplex Mode |
| n34 | 15 | 5, 10, 15 | -100 + 10log10(NRB/25) | TDD |
| 30 | 10, 15 | -97.1 + 10log10(NRB/24) |
| 60 | 10, 15 | -97.5 + 10log10(NRB/11) |
| n381 | 15 | 5, 10, 15, 20, 25, 30, 40 | -100 + 10log10(NRB/25) | TDD |
| 30 | 10, 15, 20, 25, 30, 40 | -97.1 + 10log10(NRB/24) |
| 60 | 10, 15, 20, 25, 30, 40 | -97.5 + 10log10(NRB/11) |
| n39 | 15 | 5, 10, 15, 20, 25, 30, 40 | -100 + 10log10(NRB/25) | TDD |
| 30 | 10, 15, 20, 25, 30, 40 | -97.1 + 10log10(NRB/24) |
| 60 | 10, 15, 20, 25, 30, 40 | -97.5 + 10log10(NRB/11) |
| n40 | 15 | 5, 10, 15, 20, 25, 30, 40, 50 | -100 + 10log10(NRB/25) | TDD |
| 30 | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100 | -97.1 + 10log10(NRB/24) |
| 60 | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100 | -97.5 + 10log10(NRB/11) |
| n411 | 15 | 5, 10, 15, 20, 30, 40, 50 | -94.8 + 10log10(NRB/52) | TDD |
| 30 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 | -95.1 + 10log10(NRB/24) |
| 60 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 | -95.5 + 10log10(NRB/11) |
| n481 | 15 | 5, 10, 15, 20, 30, 40, 505 | -99 + 10log10(NRB/25) | TDD |
| 30 | 10, 15, 20, 30, 40, 505, 605, 705, 805, 905, 1005 | -96.1 + 10log10(NRB/24) |
| 60 | 10, 15, 20, 30, 40, 505, 605, 705, 805, 905, 1005 | -96.5 + 10log10(NRB/11) |
| n50 | 15 | 5, 10, 15, 20, 30, 40, 50 | -100 + 10log10(NRB/25) | TDD |
| 30 | 10, 15, 20, 30, 40, 50, 60, 80 | -97.1 + 10log10(NRB/24) |
| 60 | 10, 15, 20, 30, 40, 50, 60, 80 | -97.5 + 10log10(NRB/11) |
| n51 | 15 | 5 | -100 | TDD |
| n53 | 15 | 5, 10 | -100 + 10log10(NRB/25) | TDD |
| 30 | 10 | -97.1 |
| 60 | 10 | -97.5 |
| n757 | 15 | 5,10,15,20 | -100 + 10log10(NRB/25) | SDL |
| 30 | 10,15,20 | -97.1 + 10log10(NRB/24) |
| 60 | 10,15,20 | -97.5 + 10log10(NRB/11) |
| n767 | 15 | 5 | -100 | SDL |
| n771,4 | 15 | 10, 15, 20, 40, 50 | -95.3 + 10log10(NRB/52) | TDD |
| 30 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | -95.6 + 10log10(NRB/24) |
| 60 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | -96.0 + 10log10(NRB/11) |
| n781 | 15 | 10, 15, 20, 25, 30, 40, 50 | -95.8 + 10log10(NRB/52) | TDD |
| 30 | 10, 15, 20, 40, 50, 60, 70, 80, 90, 100 | -96.1 + 10log10(NRB/24) |
| 60 | 10, 15, 20, 40, 50, 60, 70, 80, 90, 100 | -96.5 + 10log10(NRB/11) |
| n791 | 15 | 10,20,40, 50 | -95.8 + 10log10(NRB/52) | TDD |
| 30 | 10, 20, 40, 50, 60, 80, 100 | -96.1 + 10log10(NRB/24) |
| 60 | 10, 20, 40, 50, 60, 80, 100 | -96.5 + 10log10(NRB/11) |
| n91 | 15 | 5 | -100 | FDD |
| n92 | 15 | 5, 10, 15, 20 | -100 + 10log10(NRB/25) | FDD |
| 30 | 10, 15, 20 | -97.1 + 10log10(NRB/24) |
| n93 | 15 | 5 | -100 | FDD |
| n94 | 15 | 5, 10, 15, 20 | -100 + 10log10(NRB/25) | FDD |
| 30 | 10, 15, 20 | -97.1 + 10log10(NRB/24) |
| n101 | 15 | 5, 10 | -100 + 10log10(NRB/25) | TDD |
| 30 | 10 | -97.1 + 10log10(NRB/24) |
| NOTE 1: Four Rx antenna ports shall be the baseline for this operating band except for two Rx vehicular UE. Four Rx antenna ports for RedCap UE is not supported for this operating band.  NOTE 2: The transmitter shall be set to PUMAX as defined in clause 6.2.4.  NOTE 3: Void  NOTE 4: The requirement is modified by -0.5 dB when the assigned UE channel bandwidth is confined within 3300 - 3800 MHz.  NOTE 5: For these bandwidths, the minimum requirements are restricted to operation when carrier is configured as a downlink carrier part of CA configuration.  NOTE 6: Void  NOTE 7: For SDL bands, the reference sensitivity requirements shall be verified by inter-band CA combinations with SDL band, which are supported by UE.  NOTE 8: The REFSENS value is rounded to the nearest number down to one decimal point. “NRB” in REFSENS formula is the maximum transmission bandwidth configuration as defined in Table 5.3.2-1. | | | | |

For power class 2 UEs, certain degradation of the reference sensitivity in Table 7.3.2.3-1a is allowed. The maximum amount of degradation is specified in Table 7.3.2.3-1c, and in Table 7.3.2.3-1d for a UE that indicates *txDiversity-r16* [26].

Table 7.3.2.3-1c Reference Sensitivity Degradation from PC3 to PC2 for FDD bands for UE not supporting Tx Diversity

| Operating Band | 5  MHz (dB) | 10  MHz (dB) | 15  MHz (dB) | 20  MHz (dB) | 25  MHz (dB) | 30 MHz (dB) | 35 MHz (dB) | 40  MHz (dB) | 45 MHz (dB) | 50  MHz (dB) |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| n1 | 0 | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 |
| n3 | 0.5 | 0.5 | 0.5 | 0.5 | 0.6 | 0.8 | 1.1 | 1.5 | 2.3 | 2.8 |
| n8 | 0.5 | 0.7 | 0.8 | 2.3 | 2.8 | 3.2 | 3.1 |  |  |  |
| NOTE 1: The transmitter shall be set to PUMAX as defined in clause 6.2.4 | | | | | | | | | | |

Table 7.3.2.3-1d Reference Sensitivity Degradation from PC3 to PC2 for FDD bands for UE supporting Tx Diversity

| Operating Band | 5  MHz (dB) | 10  MHz (dB) | 15  MHz (dB) | 20  MHz (dB) | 25  MHz (dB) | 30 MHz (dB) | 35 MHz (dB) | 40  MHz (dB) | 45 MHz (dB) | 50  MHz (dB) |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| n1 | 0 | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 |
| n3 | 1.4 | 1.5 | 1.5 | 1.5 | 1.6 | 1.7 | 2.8 | 5 | 5.5 | 6.0 |
| n8 | 1.3 | 1.4 | 2.1 | 5.8 | 6.1 | 6.5 | 7.0 |  |  |  |
| NOTE 1: The transmitter shall be set to PUMAX as defined in clause 6.2G.4 | | | | | | | | | | |

For UE(s) equipped with 4 Rx antenna ports, reference sensitivity for 2Rx antenna ports in Table 7.3.2.3-1a and in Table 7.3.2.3-1b shall be modified by the amount given in ΔRIB,4R in Table 7.3.2.3-2 for the applicable operating bands.

Table 7.3.2.3-2: Four antenna port reference sensitivity allowance ΔRIB,4R

|  |  |
| --- | --- |
| Operating band | ΔRIB,4R (dB) |
| n8, n28, n71 | -2.71 |
| n1, n2, n3, n30, n40, n7, n34, n38, n39, n41, n66, n70 | -2.7 |
| n48, n77, n78, n79 | -2.2 |
| NOTE 1: 4 Rx operation is targeted for FWA form factor | |

The reference sensitivity (REFSENS) requirement specified in Table 7.3.2.3-1a, Table 7.3.2.3-1b, Table 7.3.2.3-1c, Table 7.3.2.3-1d and Table 7.3.2.3-2 shall be met with uplink transmission bandwidth less than or equal to that specified in Table 7.3.2.3-3.

Table 7.3.2.3-3: Uplink configuration for reference sensitivity

| Operating band / SCS (kHz) / Channel bandwidth (MHz) / Duplex mode | | | | | | | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Operating Band | SCS | 3 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 60 | 70 | 80 | 90 | 100 | Duplex Mode |
| n1 | 15 |  | 25 | 501 | 751 | 1001 | 1281 | 1281 |  | 1281 | 1281 | 1281 |  |  |  |  |  | FDD |
|  | 30 |  |  | 24 | 361 | 501 | 641 | 641 |  | 641 | 641 | 641 |  |  |  |  |  |  |
|  | 60 |  |  | 101 | 18 | 24 | 301 | 301 |  | 301 | 301 | 301 |  |  |  |  |  |  |
| n2 | 15 |  | 25 | 501 | 501 | 501 | 501 | 481 |  | 401 |  |  |  |  |  |  |  | FDD |
|  | 30 |  | 101 | 24 | 241 | 241 | 241 | 241 |  | 201 |  |  |  |  |  |  |  |  |
|  | 60 |  |  | 101 | 101 | 101 | 101 | 101 |  | 101 |  |  |  |  |  |  |  |  |
| n3 | 15 |  | 25 | 501 | 501 | 501 | 501 | 501 | 501 | 501 | 501 | 501 |  |  |  |  |  | FDD |
|  | 30 |  |  | 24 | 241 | 241 | 241 | 241 | 241 | 241 | 241 | 241 |  |  |  |  |  |  |
|  | 60 |  |  | 101 | 101 | 101 | 101 | 101 | 101 | 101 | 101 | 101 |  |  |  |  |  |  |
| n5 | 15 |  | 25 | 251 | 251 | 251 | Note 5 |  |  |  |  |  |  |  |  |  |  | FDD |
|  | 30 |  |  | 101 | 101 | 101 | Note 5 |  |  |  |  |  |  |  |  |  |  |  |
| n7 | 15 |  | 25 | 501 | 751 | 751 | 721 | 641 |  | 451 |  | 451 |  |  |  |  |  | FDD |
|  | 30 |  |  | 24 | 361 | 361 | 361 | 321 |  | 201 |  | 201 |  |  |  |  |  |  |
|  | 60 |  |  | 101 | 18 | 181 | 181 | 161 |  | 101 |  | 101 |  |  |  |  |  |  |
| n8 | 15 |  | 25 | 251 | 251 | 251 |  |  | Note 5 |  |  |  |  |  |  |  |  | FDD |
|  | 30 |  |  | 101 | 101 | 101 |  |  | Note 5 |  |  |  |  |  |  |  |  |  |
| n12 | 15 |  | 201 | 201 | 201 |  |  |  |  |  |  |  |  |  |  |  |  | FDD |
|  | 30 |  |  | 101 | 101 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n13 | 15 |  | 201 | 201 |  |  |  |  |  |  |  |  |  |  |  |  |  | FDD |
| 30 |  |  | 101 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n14 | 15 |  | 201 | 201 |  |  |  |  |  |  |  |  |  |  |  |  |  | FDD |
|  | 30 |  |  | 101 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n20 | 15 |  | 25 | 201 | 202 | 202 |  |  |  |  |  |  |  |  |  |  |  | FDD |
|  | 30 |  |  | 101 | 102 | 102 |  |  |  |  |  |  |  |  |  |  |  |  |
| n24 | 15 |  | 25 | 50 |  |  |  |  |  |  |  |  |  |  |  |  |  | FDD |
|  | 30 |  |  | 24 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n25 | 15 |  | 25 | 501 | 501 | 501 | 501 | 481 | 401 | 401 | Note 5 |  |  |  |  |  |  | FDD |
|  | 30 |  |  | 24 | 241 | 241 | 241 | 241 | 201 | 201 | Note 5 |  |  |  |  |  |  |  |
|  | 60 |  |  | 101 | 101 | 101 | 101 | 101 | 101 | 101 | Note 5 |  |  |  |  |  |  |  |
| n26 | 15 | 15 | 25 | 251 | 251 | 251 |  |  |  |  |  |  |  |  |  |  |  | FDD |
|  | 30 |  |  | 121 | 121 | 121 |  |  |  |  |  |  |  |  |  |  |  |  |
| n28 | 15 | 15 | 25 | 251 | 251 | 251 |  | 251 |  |  |  |  |  |  |  |  |  | FDD |
|  | 30 |  |  | 101 | 101 | 101 |  | 101 |  |  |  |  |  |  |  |  |  |  |
| n30 | 15 |  | 201 | 201 |  |  |  |  |  |  |  |  |  |  |  |  |  | FDD |
|  | 30 |  |  | 101 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n34 | 15 |  | 25 | 50 | 75 |  |  |  |  |  |  |  |  |  |  |  |  | TDD |
|  | 30 |  |  | 24 | 36 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  | 10 | 18 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n38 | 15 |  | 25 | 50 | 75 | 100 | 128 | 160 |  | 216 |  |  |  |  |  |  |  | TDD |
|  | 30 |  |  | 24 | 36 | 50 | 64 | 75 |  | 100 |  |  |  |  |  |  |  |  |
|  | 60 |  |  | 10 | 18 | 24 | 30 | 36 |  | 50 |  |  |  |  |  |  |  |  |
| n39 | 15 |  | 25 | 50 | 75 | 100 | 128 | 160 |  | 216 |  |  |  |  |  |  |  | TDD |
|  | 30 |  |  | 24 | 36 | 50 | 64 | 75 |  | 100 |  |  |  |  |  |  |  |  |
|  | 60 |  |  | 10 | 18 | 24 | 30 | 36 |  | 50 |  |  |  |  |  |  |  |  |
| n40 | 15 |  | 25 | 50 | 75 | 100 | 128 | 160 |  | 216 |  | 270 |  |  |  |  |  | TDD |
|  | 30 |  |  | 24 | 36 | 50 | 64 | 75 |  | 100 |  | 128 | 162 |  | 216 |  |  |  |
|  | 60 |  |  | 10 | 18 | 24 | 30 | 36 |  | 50 |  | 64 | 75 |  | 100 |  |  |  |
| n41 | 15 |  | 25 | 50 | 75 | 100 |  | 160 |  | 216 |  | 270 |  |  |  |  |  | TDD |
|  | 30 |  |  | 24 | 36 | 50 |  | 75 |  | 100 |  | 128 | 162 | 180 | 216f | 243 | 270 |  |
|  | 60 |  |  | 10 | 18 | 24 |  | 36 |  | 50 |  | 64 | 75 | 90 | 100 | 120 | 135 |  |
| n48 | 15 |  | 25 | 50 | 75 | 100 |  | 160 |  | 216 |  |  |  |  |  |  |  | TDD |
|  | 30 |  |  | 24 | 36 | 50 |  | 75 |  | 100 |  |  |  |  |  |  |  |  |
|  | 60 |  |  | 10 | 18 | 24 |  | 36 |  | 50 |  |  |  |  |  |  |  |  |
| n50 | 15 |  | 25 | 50 | 75 | 100 |  | 160 |  | 216 |  | 270 |  |  |  |  |  | TDD |
|  | 30 |  |  | 24 | 36 | 50 |  | 75 |  | 100 |  | 128 | 162 |  | Note 3 |  |  |  |
|  | 60 |  |  | 10 | 18 | 24 |  | 36 |  | 50 |  | 64 | 75 |  | Note 3 |  |  |  |
| n51 | 15 |  | 25 |  |  |  |  |  |  |  |  |  |  |  |  |  |  | TDD |
| n53 | 15 |  | 25 | 50 |  |  |  |  |  |  |  |  |  |  |  |  |  | TDD |
|  | 30 |  |  | 24 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n65 | 15 |  | 25 | 501 | 751 | 1001 |  |  |  |  |  |  |  |  |  |  |  | FDD |
|  | 30 |  |  | 24 | 361 | 501 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  | 101 | 18 | 24 |  |  |  |  |  |  |  |  |  |  |  |  |
| n66 | 15 |  | 25 | 501 | 751 | 1001 | 1281 | 160 |  | 216 |  |  |  |  |  |  |  | FDD |
|  | 30 |  |  | 24 | 361 | 501 | 641 | 751 |  | 1001 |  |  |  |  |  |  |  |  |
|  | 60 |  |  | 101 | 18 | 24 | 301 | 361 |  | 501 |  |  |  |  |  |  |  |  |
| n70 | 15 |  | 25 | 501 | 751 | Note 3 | Note 3 |  |  |  |  |  |  |  |  |  |  | FDD |
|  | 30 |  |  | 24 | 361 | Note 3 | Note 3 |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  | 101 | 18 | Note 3 | Note 3 |  |  |  |  |  |  |  |  |  |  |  |
| n71 | 15 |  | 25 | 251 | 201 | 201 | 201,6 | 201,6 | 201,6 |  |  |  |  |  |  |  |  | FDD |
|  | 30 |  |  | 121 | 101 | 101 | 101,6 | 101,6 | 101,6 |  |  |  |  |  |  |  |  |  |
| n74 | 15 |  | 25 | 251 | 251 | 251 |  |  |  |  |  |  |  |  |  |  |  | FDD |
|  | 30 |  |  | 101 | 101 | 101 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  | 51 | 51 | 51 |  |  |  |  |  |  |  |  |  |  |  |  |
| n77 | 15 |  |  | 50 | 75 | 100 |  |  |  | 216 |  | 270 |  |  |  |  |  | TDD |
|  | 30 |  |  | 24 | 36 | 50 |  |  |  | 100 |  | 128 | 162 | 180 | 216 | 243 | 270 |  |
|  | 60 |  |  | 10 | 18 | 24 |  |  |  | 50 |  | 64 | 75 | 90 | 100 | 120 | 135 |  |
| n78 | 15 |  |  | 50 | 75 | 100 | 128 | 160 |  | 216 |  | 270 |  |  |  |  |  | TDD |
|  | 30 |  |  | 24 | 36 | 50 | 64 | 75 |  | 100 |  | 128 | 162 | 180 | 216 | 243 | 270 |  |
|  | 60 |  |  | 10 | 18 | 24 | 30 | 36 |  | 50 |  | 64 | 75 | 90 | 100 | 120 | 135 |  |
| n79 | 15 |  |  | 50 |  | 100 |  |  |  | 216 |  | 270 |  |  |  |  |  | TDD |
|  | 30 |  |  | 24 |  | 50 |  |  |  | 100 |  | 128 | 162 |  | 216 |  | 270 |  |
|  | 60 |  |  | 10 |  | 24 |  |  |  | 50 |  | 64 | 75 |  | 100 |  | 135 |  |
| n85 | 15 | 15 | 201 | 201 | 201 |  |  |  |  |  |  |  |  |  |  |  |  | FDD |
|  | 30 |  |  | 101 | 101 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n91 | 15 |  | 254 | 201,4 |  |  |  |  |  |  |  |  |  |  |  |  |  | FDD |
| 30 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n92 | 15 |  | 25 | 201 | 201 | 201 |  |  |  |  |  |  |  |  |  |  |  | FDD |
| 30 |  |  | 101 | 101 | 101 |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n93 | 15 |  | 254 | 251,4 |  |  |  |  |  |  |  |  |  |  |  |  |  | FDD |
| 30 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n94 | 15 |  | 25 | 251 | 201 | 201 |  |  |  |  |  |  |  |  |  |  |  | FDD |
| 30 |  |  | 121 | 101 | 101 |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n100 | 15 | 15 | 25 |  |  |  |  |  |  |  |  |  |  |  |  |  |  | FDD |
| 30 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n101 | 15 |  | 25 | 50 |  |  |  |  |  |  |  |  |  |  |  |  |  | TDD |
| 30 |  |  | 24 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n106 | 15 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | FDD |
| NOTE 1: UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.3.2-1).  NOTE 2: For band n20; for 15kHz SCS, in the case of 15MHz channel bandwidth, the UL resource blocks shall be located at RBstart =11 and in the case of 20MHz channel bandwidth, the UL resource blocks shall be located at RBstart =16; for 30kHz SCS, in the case of 15MHz channel bandwidth, the UL resource blocks shall be located at RBstart =6 and in the case of 20MHz channel bandwidth, the UL resource blocks shall be located at RBstart =8; for 60kHz SCS, in the case of 15MHz channel bandwidth, the UL resource blocks shall be located at RBstart =3 and in the case of 20MHz channel bandwidth, the UL resource blocks shall be located at RBstart =4.  NOTE 3: For DL channel bandwidths that do not have symmetric UL channel bandwidth, highest valid UL configuration with lowest duplex distance shall be used.  NOTE 4: For band n91 and n93, largest supported UL bandwidth configuration shall be used.  NOTE 5: For this DL channel bandwidth, the UL configuration of the highest UL channel bandwidth specified in Table 5.3.6-1 and the nominal Tx-Rx frequency separation specified in Table 5.4.4-1 shall be used, i.e. ΔFTX-RX as defined in clause 5.3.does not apply.  Note 6: UEs supporting the optional symmetrical UL/DL bandwidths shall use this UL configuration. For UEs not supporting this uplink channel bandwidth, the UL configuration of the 20MHz UL channel bandwidth and the nominal Tx-Rx frequency separation specified in Table 5.4.4-1 shall be used, i.e. ΔFTX-RX as defined in clause 5.3.6 does not apply. | | | | | | | | | | | | | | | | | | |

Unless given by Table 7.3.2.3-4, the minimum requirements specified in Tables 7.3.2.3-1a, Tables 7.3.2.3-1b, Tables 7.3.2.3-1c, Tables 7.3.2.3-1d shall be verified with the network signalling value NS\_01 (Table 6.2.3.3-1) configured.

Table 7.3.2.3-4: Network signalling value for reference sensitivity

|  |  |
| --- | --- |
| Operating band | Network Signalling value |
| n2 | NS\_03 |
| n12 | NS\_06 |
| n13 | NS\_06 |
| n14 | NS\_06 |
| n24 | NS\_56 |
| n25 | NS\_03 |
| n30 | NS\_21 |
| n48 | NS\_27 |
| n53 | NS\_45 |
| n66 | NS\_03 |
| n70 | NS\_03 |
| n71 | NS\_35 |
| n85 | NS\_06 |

For the UE which supports CA, SUL or DC band combination, the minimum requirement for reference sensitivity in Table 7.3.2.3-1a and Table 7.3.2.3-1b shall be increased by the amount given in ΔRIB,c defined in subclause 7.3.3 for the applicable operating bands.

The normative reference for this requirement is TS 38.101-1 [2] clause 7.3.2.

7.3.2.4 Test description

7.3.2.4.1 Initial conditions

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

The initial test configurations consist of environmental conditions, test frequencies, and channel bandwidths based on NR operating bands specified in Table 5.3.5-1. All of these configurations shall be tested with applicable test parameters for each channel bandwidth, and are shown in Table 7.3.2.4.1-1, Table 7.3.2.4.1-2, and Table 7.3.2.4.1-3 The details of the uplink reference measurement channels (RMCs) are specified in Annexe A2.2. Configurations of PDSCH and PDCCH before measurement are specified in Annex C.2.

Table 7.3.2.4.1-1: Test Configuration Table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Initial Conditions | | | | |
| Test Environment as specified in TS 38.508-1 [5] subclause 4.1 | | | Normal, TL/VL, TL/VH, TH/VL, TH/VH | |
| Test Frequencies as specified in TS 38.508-1 [5] subclause4.3.1 | | | Low range, Mid range, High range (NOTE 4) | |
| Test Channel Bandwidths as specified in TS 38.508-1 [5] subclause 4.3.1 | | | Lowest, Mid, Highest  Lowest UL / Lowest DL, Lowest UL / Highest DL (NOTE 3) | |
| Test SCS as specified in Table 5.3.5-1 | | | Lowest | |
| Test Parameters | | | | |
| Test ID | Downlink Configuration | | Uplink Configuration | |
|  | Modulation | RB allocation | Modulation | RB allocation |
| 1 | CP-OFDM QPSK | Full RB (NOTE 1) | DFT-s-OFDM QPSK | REFSENS (NOTE 2) |
| NOTE 1: Full RB allocation shall be used per each SCS and channel BW as specified in Table 7.3.2.4.1-2.  NOTE 2: REFSENS refers to Table 7.3.2.4.1-3 which defines uplink RB configuration and start RB location for each SCS, channel BW and NR band.  NOTE 3: Additional test points selected according to asymmetric channel bandwidths specified in clause 5.3.6. DL channel bandwidth shall be selected first.  NOTE 4: For NR band n28, 30MHz test channel bandwidth is tested with Low range and High range test frequencies.  NOTE 5: In a band where UE supports 4Rx, the test needs to be repeated with only 2Rx antennas connected and the other antennas terminated. | | | | |

Table 7.3.2.4.1-2: Downlink Configuration of each RB allocation

|  |  |  |  |
| --- | --- | --- | --- |
| Channel Bandwidth | SCS(kHz) | LCRBmax | Outer RB allocation / Normal RB allocation |
| 3MHz | 15 | 15 | 15@0 |
| 5MHz | 15 | 25 | 25@0 |
| 30 | 11 | 11@0 |
| 60 | N/A | N/A |
| 10MHz | 15 | 52 | 52@0 |
| 30 | 24 | 24@0 |
| 60 | 11 | 11@0 |
| 15MHz | 15 | 79 | 79@0 |
| 30 | 38 | 38@0 |
| 60 | 18 | 18@0 |
| 20MHz | 15 | 106 | 106@0 |
| 30 | 51 | 51@0 |
| 60 | 24 | 24@0 |
| 25MHz | 15 | 133 | 133@0 |
| 30 | 65 | 65@0 |
| 60 | 31 | 31@0 |
| 30MHz | 15 | 160 | 160@0 |
| 30 | 78 | 78@0 |
| 60 | 38 | 38@0 |
| 35MHz | 15 | 188 | 188@0 |
| 30 | 92 | 92@0 |
| 60 | 44 | 38@0 |
| 40MHz | 15 | 216 | 216@0 |
| 30 | 106 | 106@0 |
| 60 | 51 | 51@0 |
| 45MHz | 15 | 242 | 242@0 |
| 30 | 119 | 119@0 |
| 60 | 58 | 58@0 |
| 50MHz | 15 | 270 | 270@0 |
| 30 | 133 | 133@0 |
| 60 | 65 | 65@0 |
| 60MHz | 15 | N/A | N/A |
| 30 | 162 | 162@0 |
| 60 | 79 | 79@0 |
| 70MHz | 15 | N/A | N/A |
| 30 | 189 | 189@0 |
| 60 | 93 | 93@0 |
| 80MHz | 15 | N/A | N/A |
| 30 | 217 | 217@0 |
| 60 | 107 | 107@0 |
| 90MHz | 15 | N/A | N/A |
| 30 | 245 | 245@0 |
| 60 | 121 | 121@0 |
| 100MHz | 15 | N/A | N/A |
| 30 | 273 | 273@0 |
| 60 | 135 | 135@0 |
| NOTE 1: Test Channel Bandwidths are checked separately for each NR band, the applicable channel bandwidths are specified in Table 5.3.5-1. | | | |

Table 7.3.2.4.1-3: Uplink configuration for reference sensitivity, LCRB @ RBstart format

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Operating  Band | SCS  (kHz) | 3  MHz | 5  MHz | 10  MHz | 15  MHz | 20  MHz | 25  MHz | 30  MHz | 35  MHz | 40  MHz | 45  MHz | 50  MHz | 60  MHz | 70  MHz | 80  MHz | 90  MHz | 100  MHz | Duplex  Mode |
| n1 | 15 |  | 25@0 | 50@21 | 75@41 | 100@61 | 128@51 | 128@321 |  | 128@881 | 128@1141 | 128@1421 |  |  |  |  |  | FDD |
| 30 |  |  | 24@0 | 36@21 | 50@11 | 64@11 | 64@141 |  | 64@421 | 64@551 | 64@691 |  |  |  |  |  |
| 60 |  |  | 10@11 | 18@0 | 24@0 | 30@11 | 30@81 |  | 30@211 | 30@281 | 30@351 |  |  |  |  |  |
| n2 | 15 |  | 25@0 | 50@21 | 50@291 | 50@561 | 50@831 | 48@1121 |  | 40@1761 |  |  |  |  |  |  |  | FDD |
| 30 |  | 10@11 | 24@0 | 24@141 | 24@271 | 24@411 | 24@541 |  | 20@861 |  |  |  |  |  |  |  |
| 60 |  |  | 10@11 | 10@81 | 10@141 | 10@211 | 10@281 |  | 10@411 |  |  |  |  |  |  |  |
| n3 | 15 |  | 25@0 | 50@21 | 50@291 | 50@561 | 50@831 | 50@1101 | 50@1381 | 50@1661 | 50@1921 | 50@2201 |  |  |  |  |  | FDD |
| 30 |  |  | 24@0 | 24@141 | 24@271 | 24@411 | 24@541 | 24@681 | 24@821 | 24@951 | 24@1091 |  |  |  |  |  |
| 60 |  |  | 10@11 | 10@81 | 10@141 | 10@211 | 10@281 | 10@341 | 10@411 | 10@481 | 10@551 |  |  |  |  |  |
| n5 | 15 |  | 25@0 | 25@271 | 25@541 | 25@811 | Note 5 |  |  |  |  |  |  |  |  |  |  | FDD |
| 30 |  |  | 10@141 | 10@281 | 10@411 | Note 5 |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n7 | 15 |  | 25@0 | 50@21 | 75@41 | 75@311 | 72@611 | 64@961 |  | 45@1711 |  | 45@2251 |  |  |  |  |  | FDD |
| 30 |  |  | 24@0 | 36@21 | 36@151 | 36@291 | 32@461 |  | 20@861 |  | 20@1131 |  |  |  |  |  |
| 60 |  |  | 10@11 | 18@0 | 18@61 | 18@131 | 16@221 |  | 10@411 |  | 10@551 |  |  |  |  |  |
| n8 | 15 |  | 25@0 | 25@271 | 25@541 | 25@811 |  |  | Note 5 |  |  |  |  |  |  |  |  | FDD |
| 30 |  |  | 10@141 | 10@281 | 10@411 |  |  | Note 5 |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n12 | 15 |  | 20@51 | 20@321 | 20@591 |  |  |  |  |  |  |  |  |  |  |  |  | FDD |
| 30 |  |  | 10@141 | 10@281 |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n13 | 15 |  | 20@01 | 20@01 |  |  |  |  |  |  |  |  |  |  |  |  |  | FDD |
| 30 |  |  | 10@01 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n14 | 15 |  | 20@01 | 20@01 |  |  |  |  |  |  |  |  |  |  |  |  |  | FDD |
| 30 |  |  | 10@01 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n20 | 15 |  | 25@0 | 20@01 | 20@112 | 20@162 |  |  |  |  |  |  |  |  |  |  |  | FDD |
| 30 |  |  | 10@01 | 10@62 | 10@82 |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n24 | 15 |  | 25@0 | 50@0 |  |  |  |  |  |  |  |  |  |  |  |  |  | FDD |
| 30 |  |  | 24@0 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  | 10@0 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n25 | 15 |  | 25@0 | 50@21 | 50@291 | 50@561 | 50@831 | 48@1121 | 40@1481 | 40@1761 | Note 5 |  |  |  |  |  |  | FDD |
| 30 |  |  | 24@0 | 24@141 | 24@271 | 24@411 | 24@541 | 20@721 | 20@861 | Note 5 |  |  |  |  |  |  |
| 60 |  |  | 10@11 | 10@81 | 10@141 | 10@211 | 10@281 | 10@341 | 10@411 | Note 5 |  |  |  |  |  |  |
| n26 | 15 | 15@0 | 25@0 | 25@271 | 25@541 | 25@811 |  |  |  |  |  |  |  |  |  |  |  | FDD |
| 30 |  |  | 12@121 | 12@261 | 12@391 |  |  |  |  |  |  |  |  |  |  |  |
| n28 | 15 | 15@0 | 25@0 | 25@271 | 25@541 | 25@811 |  | 25@1351 |  |  |  |  |  |  |  |  |  | FDD |
| 30 |  |  | 10@141 | 10@281 | 10@411 |  | 10@681 |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n30 | 15 |  | 20@51 | 20@321 |  |  |  |  |  |  |  |  |  |  |  |  |  | FDD |
| 30 |  |  | 10@141 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n34 | 15 |  | 25@0 | 50@0 | 75@0 |  |  |  |  |  |  |  |  |  |  |  |  | TDD |
| 30 |  |  | 24@0 | 36@0 |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  | 10@0 | 18@0 |  |  |  |  |  |  |  |  |  |  |  |  |
| n38 | 15 |  | 25@0 | 50@0 | 75@0 | 100@0 | 128@0 | 160@0 |  | 216@0 |  |  |  |  |  |  |  | TDD |
| 30 |  |  | 24@0 | 36@0 | 50@0 | 64@0 | 75@0 |  | 100@0 |  |  |  |  |  |  |  |
| 60 |  |  | 10@0 | 18@0 | 24@0 | 30@0 | 36@0 |  | 50@0 |  |  |  |  |  |  |  |
| n39 | 15 |  | 25@0 | 50@0 | 75@0 | 100@0 | 128@0 | 160@0 |  | 216@0 |  |  |  |  |  |  |  | TDD |
| 30 |  |  | 24@0 | 36@0 | 50@0 | 64@0 | 75@0 |  | 100@0 |  |  |  |  |  |  |  |
| 60 |  |  | 10@0 | 18@0 | 24@0 | 30@0 | 36@0 |  | 50@0 |  |  |  |  |  |  |  |
| n40 | 15 |  | 25@0 | 50@0 | 75@0 | 100@0 | 128@0 | 160@0 |  | 216@0 |  | 270@0 |  |  |  |  |  | TDD |
| 30 |  |  | 24@0 | 36@0 | 50@0 | 64@0 | 75@0 |  | 100@0 |  | 128@0 | 162@0 |  | 216@0 |  |  |
| 60 |  |  | 10@0 | 18@0 | 24@0 | 30@0 | 36@0 |  | 50@0 |  | 64@0 | 75@0 |  | 100@0 |  |  |
| n41 | 15 |  | 25@0 | 50@0 | 75@0 | 100@0 |  | 160@0 |  | 216@0 |  | 270@0 |  |  |  |  |  | TDD |
| 30 |  |  | 24@0 | 36@0 | 50@0 |  | 75@0 |  | 100@0 |  | 128@0 | 162@0 | 180@0 | 216@0 | 243@0 | 270@0 |
| 60 |  |  | 10@0 | 18@0 | 24@0 |  | 36@0 |  | 50@0 |  | 64@0 | 75@0 | 90@0 | 100@0 | 120@0 | 135@0 |
| n48 | 15 |  | 25@0 | 50@0 | 75@0 | 100@0 |  | 160@0 |  | 216@0 |  |  |  |  |  |  |  | TDD |
| 30 |  |  | 24@0 | 36@0 | 50@0 |  | 75@0 |  | 100@0 |  |  |  |  |  |  |  |
| 60 |  |  | 10@0 | 18@0 | 24@0 |  | 36@0 |  | 50@0 |  |  |  |  |  |  |  |
| n50 | 15 |  | 25@0 | 50@0 | 75@0 | 100@0 |  |  |  | 216@0 |  | 270@0 |  |  |  |  |  | TDD |
| 30 |  |  | 24@0 | 36@0 | 50@0 |  |  |  | 100@0 |  | 128@0 | 162@0 |  | NOTE 3 |  |  |
| 60 |  |  | 10@0 | 18@0 | 24@0 |  |  |  | 50@0 |  | 64@0 | 75@0 |  | NOTE 3 |  |  |
| n51 | 15 |  | 25@0 |  |  |  |  |  |  |  |  |  |  |  |  |  |  | TDD |
| 30 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n53 | 15 |  | 25@0 | 50@0 |  |  |  |  |  |  |  |  |  |  |  |  |  | TDD |
| 30 |  |  | 24@0 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  | 10@0 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n65 | 15 |  | 25@0 | 50@21 | 75@41 | 100@61 |  |  |  |  |  |  |  |  |  |  |  | FDD |
| 30 |  |  | 24@0 | 36@21 | 50@11 |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  | 10@11 | 18@0 | 24@0 |  |  |  |  |  |  |  |  |  |  |  |
| n66 | 15 |  | 25@0 | 50@21 | 75@41 | 100@61 | 128@51 | 160@0 |  | 216@0 |  |  |  |  |  |  |  | FDD |
| 30 |  |  | 24@0 | 36@21 | 50@11 | 64@11 | 75@31 |  | 100@61 |  |  |  |  |  |  |  |
| 60 |  |  | 10@11 | 18@0 | 24@0 | 30@11 | 36@21 |  | 50@11 |  |  |  |  |  |  |  |
| n70 | 15 |  | 25@0 | 50@21 | 75@41 | NOTE 3 | NOTE 3 |  |  |  |  |  |  |  |  |  |  | FDD |
| 30 |  |  | 24@0 | 36@21 | NOTE 3 | NOTE 3 |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  | 10@11 | 18@0 | NOTE 3 | NOTE 3 |  |  |  |  |  |  |  |  |  |  |
| n71 | 15 |  | 25@0 | 25@01 | 20@01 | 20@01 | 20@01,6 | 20@01,6 | 20@01,6 |  |  |  |  |  |  |  |  | FDD |
| 30 |  |  | 12@01 | 10@01 | 10@01 | 10@01,6 | 10@01,6 | 10@01,6 |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n74 | 15 |  | 25@0 | 25@271 | 25@541 | 25@811 |  |  |  |  |  |  |  |  |  |  |  | FDD |
| 30 |  |  | 10@141 | 10@281 | 10@411 |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  | 5@61 | 5@131 | 5@191 |  |  |  |  |  |  |  |  |  |  |  |
| n77 | 15 |  |  | 50@0 | 75@0 | 100@0 | 128@0 | 160@0 |  | 216@0 |  | 270@0 |  |  |  |  |  | TDD |
| 30 |  |  | 24@0 | 36@0 | 50@0 | 64@0 | 75@0 |  | 100@0 |  | 128@0 | 162@0 | 180@0 | 216@0 | 243@0 | 270@0 |
| 60 |  | - | 10@0 | 18@0 | 24@0 | 30@0 | 36@0 |  | 50@0 |  | 64@0 | 75@0 | 90@0 | 100@0 | 120@0 | 135@0 |
| n78 | 15 |  |  | 50@0 | 75@0 | 100@0 | 128@0 | 160@0 |  | 216@0 |  | 270@0 |  |  |  |  |  | TDD |
| 30 |  |  | 24@0 | 36@0 | 50@0 | 64@0 | 75@0 |  | 100@0 |  | 128@0 | 162@0 | 180@0 | 216@0 | 243@0 | 270@0 |
| 60 |  |  | 10@0 | 18@0 | 24@0 | 30@0 | 36@0 |  | 50@0 |  | 64@0 | 75@0 | 90@0 | 100@0 | 120@0 | 135@0 |
| n79 | 15 |  |  | 50@0 |  | 100@0 |  |  |  | 216@0 |  | 270@0 |  |  |  |  |  | TDD |
| 30 |  |  | 24@0 |  | 50@0 |  |  |  | 100@0 |  | 128@0 | 162@0 |  | 216@0 |  | 270@0 |
| 60 |  |  | 10@0 |  | 24@0 |  |  |  | 50@0 |  | 64@0 | 75@0 |  | 100@0 |  | 135@0 |
| n85 | 15 | 15@0 | 20@51 | 20@321 | 20@591 |  |  |  |  |  |  |  |  |  |  |  |  | FDD |
| 30 |  |  | 10@141 | 10@281 |  |  |  |  |  |  |  |  |  |  |  |  |
| n91 | 15 |  | 25@04 | 20@321, 4 |  |  |  |  |  |  |  |  |  |  |  |  |  | FDD |
| 30 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n92 | 15 |  | 25@0 | 20@321 | 20@591 | 20@861 |  |  |  |  |  |  |  |  |  |  |  | FDD |
| 30 |  |  | 10@141 | 10@281 | 10@411 |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n93 | 15 |  | 25@04 | 25@271, 4 |  |  |  |  |  |  |  |  |  |  |  |  |  | FDD |
| 30 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n94 | 15 |  | 25@0 | 25@271 | 20@591 | 20@861 |  |  |  |  |  |  |  |  |  |  |  | FDD |
| 30 |  |  | 12@121 | 10@281 | 10@411 |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n100 | 15 | 15@0 | 25@0 |  |  |  |  |  |  |  |  |  |  |  |  |  |  | FDD |
| 30 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n101 | 15 |  | 25@0 | 50@0 |  |  |  |  |  |  |  |  |  |  |  |  |  | TDD |
| 30 |  |  | 24@0 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n106 | 15 | 15@0 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | FDD |
| NOTE 1: UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.3.2-1).  NOTE 2: For band n20; for 15kHz SCS, in the case of 15MHz channel bandwidth, the UL resource blocks shall be located at RBstart =11 and in the case of 20MHz channel bandwidth, the UL resource blocks shall be located at RBstart =16; for 30kHz SCS, in the case of 15MHz channel bandwidth, the UL resource blocks shall be located at RBstart =6 and in the case of 20MHz channel bandwidth, the UL resource blocks shall be located at RBstart =8; for 60kHz SCS, in the case of 15MHz channel bandwidth, the UL resource blocks shall be located at RBstart =3 and in the case of 20MHz channel bandwidth, the UL resource blocks shall be located at RBstart =4.  NOTE 3: For DL channel bandwidths that do not have symmetric UL channel bandwidth, highest valid UL configuration with lowest duplex distance shall be used.  NOTE 4: For band n91 and n93, largest supported UL bandwidth configuration shall be used.  NOTE 5: For this DL channel bandwidth, the UL configuration of the highest UL channel bandwidth specified in Table 5.3.6-1 and the nominal Tx-Rx frequency separation specified in Table 5.4.4-1 shall be used, i.e. ΔFTX-RX as defined in clause 5.3. does not apply.  Note 6: UEs supporting the optional symmetrical UL/DL bandwidths shall use this UL configuration. For UEs not supporting this uplink channel bandwidth, the UL configuration of the 20MHz UL channel bandwidth and the nominal Tx-Rx frequency separation specified in Table 5.4.4-1 shall be used, i.e. ΔFTX-RX as defined in clause 5.3.6 does not apply. | | | | | | | | | | | | | | | | | | |

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [5] Annex A, Figure A.3.1.1.1 for TE diagram and section A.3.2 for UE diagram.

2. The parameter settings for the cell are set up according to TS 38.508-1 [5] subclause 4.4.3.

3. Downlink signals are initially set up according to Annex C.0, C.1, C.2, and C.3.1, and uplink signals according to Annex G.0, G.1, G.2, and G.3.1.

4. The UL and Reference Measurement Channel is set according to Table 7.3.2.4.1-1, Table 7.3.2.4.1-2, and Table 7.3.2.4.1-3.

5. Propagation conditions are set according to Annex B.0.

6. Ensure the UE is in State RRC\_CONNECTED with generic procedure parameters Connectivity *NR*, Connected without release *On,* Test Mode *On* and Test Loop Function *On* according to TS 38.508-1 [5] clause 4.5. Message contents are defined in clause 7.3.2.4.3*.*

<< UNCHANGED PARTS SKIPPED >>

Table 7.3.2.5-1b: Two antenna port reference sensitivity QPSK PREFSENS for TDD, SDL and FDD with variable duplex operation bands for PC3, PC2, PC1.5

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Operating band / SCS / Channel bandwidth / REFSENS | | | | |
| Operating band | SCS  (kHz) | Channel bandwidth (MHz) | REFSENS (dBm)8 | Duplex Mode |
| n34 | 15 | 5, 10, 15 | -100 + 10log10(NRB/25)+TT | TDD |
| 30 | 10, 15 | -97.1 + 10log10(NRB/24)+TT |
| 60 | 10, 15 | -97.5 + 10log10(NRB/11)+TT |
| n381 | 15 | 5, 10, 15, 20, 25, 30, 40 | -100 + 10log10(NRB/25)+TT | TDD |
| 30 | 10, 15, 20, 25, 30, 40 | -97.1 + 10log10(NRB/24)+TT |
| 60 | 10, 15, 20, 25, 30, 40 | -97.5 + 10log10(NRB/11)+TT |
| n39 | 15 | 5, 10, 15, 20, 25, 30, 40 | -100 + 10log10(NRB/25)+TT | TDD |
| 30 | 10, 15, 20, 25, 30, 40 | -97.1 + 10log10(NRB/24)+TT |
| 60 | 10, 15, 20, 25, 30, 40 | -97.5 + 10log10(NRB/11)+TT |
| n40 | 15 | 5, 10, 15, 20, 25, 30, 40, 50 | -100 + 10log10(NRB/25)+TT | TDD |
| 30 | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100 | -97.1 + 10log10(NRB/24)+TT |
| 60 | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100 | -97.5 + 10log10(NRB/11)+TT |
| n411 | 15 | 5, 10, 15, 20, 30, 40, 50 | -94.8 + 10log10(NRB/52)+TT | TDD |
| 30 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 | -95.1 + 10log10(NRB/24)+TT |
| 60 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 | -95.5 + 10log10(NRB/11)+TT |
| n481 | 15 | 5, 10, 15, 20, 30, 40, 505 | -99 + 10log10(NRB/25)+TT | TDD |
| 30 | 10, 15, 20, 30, 40, 505, 605, 705, 805, 905, 1005 | -96.1 + 10log10(NRB/24) +TT |
| 60 | 10, 15, 20, 30, 40, 505, 605, 705, 805, 905, 1005 | -96.5 + 10log10(NRB/11)+TT |
| n50 | 15 | 5, 10, 15, 20, 30, 40, 50 | -100 + 10log10(NRB/25)+TT | TDD |
| 30 | 10, 15, 20, 30, 40, 50, 60, 80 | -97.1 + 10log10(NRB/24)+TT |
| 60 | 10, 15, 20, 30, 40, 50, 60, 80 | -97.5 + 10log10(NRB/11)+TT |
| n51 | 15 | 5 | -100+TT | TDD |
| n53 | 15 | 5, 10 | -100 + 10log10(NRB/25)+TT | TDD |
| 30 | 10 | -97.1+TT |
| 60 | 10 | -97.5+TT |
| n771,4 | 15 | 10, 15, 20, 25, 30, 40, 50 | -95.3 + 10log10(NRB/52)+TT | TDD |
| 30 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | -95.6 + 10log10(NRB/24)+TT |
| 60 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | -96.0 + 10log10(NRB/11)+TT |
| n781 | 15 | 10, 15, 20, 25, 30, 40, 50 | -95.8 + 10log10(NRB/52) +TT | TDD |
| 30 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | -96.1 + 10log10(NRB/24) +TT |
| 60 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | -96.5 + 10log10(NRB/11)+TT |
| n791 | 15 | 10, 20, 40, 50 | -95.8 + 10log10(NRB/52)+TT | TDD |
| 30 | 10, 20, 40, 50, 60, 80, 100 | -96.1 + 10log10(NRB/24) +TT |
| 60 | 10, 20, 40, 50, 60, 80, 100 | -96.5 + 10log10(NRB/11) +TT |
| n91 | 15 | 5 | -100+TT | FDD |
| n92 | 15 | 5, 10, 15, 20 | -100 + 10log10(NRB/25)+TT | FDD |
| 30 | 10, 15, 20 | -97.1 + 10log10(NRB/24)+TT |
| n93 | 15 | 5 | -100+TT | FDD |
| n94 | 15 | 5, 10, 15, 20 | -100 + 10log10(NRB/25)+TT | FDD |
| 30 | 10, 15, 20 | -97.1 + 10log10(NRB/24)+TT |
| n101 | 15 | 5, 10 | -100 + 10log10(NRB/25)+TT | TDD |
| 30 | 10 | -97.1 + 10log10(NRB/24)+TT |
| NOTE 1: Four Rx antenna ports shall be the baseline for this operating band except for two Rx vehicular UE. Four Rx antenna ports for RedCap UE is not supported for this operating band.  NOTE 2: The transmitter shall be set to PUMAX as defined in clause 6.2.4.  NOTE 3: Void  NOTE 4: The requirement is modified by -0.5 dB when the assigned UE channel bandwidth is confined within 3300 - 3800 MHz.  NOTE 5: For these bandwidths, the minimum requirements are restricted to operation when carrier is configured as a downlink carrier part of CA configuration.  NOTE 6: Void  NOTE 7: For SDL bands, the reference sensitivity requirements shall be verified by inter-band CA combinations with SDL band, which are supported by UE.  NOTE 8: The REFSENS value is rounded to the nearest number down to one decimal point. “NRB” in REFSENS formula is the maximum transmission bandwidth configuration as defined in Table 5.3.2-1.  NOTE 9: TT for each frequency and channel bandwidth is specified in Table 7.3.2.5-3. | | | | |

Table 7.3.2.5-2a: Four antenna port Reference sensitivity QPSK PREFSENS FDD bands for PC3

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Operating Band | SCS (kHz) | 5  MHz (dBm) | 10  MHz (dBm) | 15  MHz (dBm) | 20  MHz (dBm) | 25  MHz (dBm) | 30  MHz (dBm) | 35  MHz (dBm) | 40  MHz (dBm) | 45 MHz  (dBm) | 50  MHz (dBm) | Duplex Mode |
| n1 | 15 | -102.7 +TT | -99.5 +TT | -97.7 +TT | -96.5 +TT | -95.4  +TT | -94.6 +TT |  | -93.3 +TT | -92.8 +TT | -92.3 +TT | FDD |
| 30 |  | -99.8 +TT | -97.8 +TT | -96.7 +TT | -95.5 +TT | -94.7 +TT |  | -93.4 +TT | -92.9 +TT | -92.4 +TT |
| 60 |  | -100.2 +TT | -98.1 +TT | -96.9 +TT | -95.7 +TT | -94.8 +TT |  | -93.6 +TT | -93 +TT | -92.4 +TT |
| n2 | 15 | -100.7 +TT | -97.5 +TT | -95.7 +TT | -94.5 +TT | -93.4 +TT | -86.8 +TT |  | -84.2 +TT |  |  | FDD |
| 30 |  | -97.8 +TT | -95.8 +TT | -94.7 +TT | -93.5 +TT | -86.9 +TT |  | -83.3 +TT |  |  |
| 60 |  | -98.2 +TT | -96.1 +TT | -94.9 +TT | -93.6 +TT | -87.0 +TT |  | -84.4 +TT |  |  |
| n3 | 15 | -99.7 +TT | -96.5 +TT | -94.7 +TT | -93.5 +TT | -92.4 +TT | -91.6 +TT | -88.9+TT | -90.3 +TT | -84.0+TT | -82.4 +TT | FDD |
| 30 |  | -96.8 +TT | -94.8 +TT | -93.7 +TT | -92.5 +TT | -91.7 +TT | -90.0+TT | -90.4 +TT | -84.1+TT | -82.5 +TT |
| 60 |  | -97.2 +TT | -95.1 +TT | -93.9 +TT | -92.7 +TT | -91.8 +TT | -90.1+TT | -90.6 +TT | -84.2+TT | -82.6 +TT |
| n71 | 15 | -100.7 +TT | -97.5 +TT | -95.7 +TT | -94.5 +TT | -93.4 +TT | -92.6 +TT |  | -91.3 +TT |  | -84.2 +TT | FDD |
| 30 |  | -97.8 +TT | -95.8 +TT | -94.7 +TT | -93.5 +TT | -92.7 +TT |  | -91.4 +TT |  | -84.2 +TT |
| 60 |  | -98.2 +TT | -97.1 +TT | -94.9 +TT | -93.7 +TT | -92.8 +TT |  | -91.6 +TT |  | -84.2 +TT |
| n8 | 15 | -99.7 +TT | -96.5 +TT | -94.1 +TT | -88.5 +TT |  |  | -81.1 +TT |  |  |  | FDD |
| 30 |  | -96.8 +TT | -94.4 +TT | -89.9 +TT |  |  | -81.2 +TT |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |
| n30 | 15 | -101.7 +TT | -98.5 +TT |  |  |  |  |  |  |  |  | FDD |
| 30 |  | -98.8 +TT |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |
| n66 | 15 | -102.2 +TT | -99.0 +TT | -97.2 +TT | -96.0 +TT | -94.9 +TT | -94.1 +TT |  | -92.8 +TT |  |  | FDD |
| 30 |  | -99.3 +TT | -97.3 +TT | -96.2 +TT | -95.0 +TT | -94.2 +TT |  | -92.9 +TT |  |  |
| 60 |  | -99.7 +TT | -97.6 +TT | -96.4 +TT | -95.2 +TT | -94.3 +TT |  | -93.1 +TT |  |  |
| n70 | 15 | -102.7 +TT | -99.5 +TT | -97.7 +TT | -96.5 +TT | -95.4 +TT |  |  |  |  |  | FDD |
| 30 |  | -99.8 +TT | -97.8 +TT | -96.7 +TT | -95.5 +TT |  |  |  |  |  |
| 60 |  | -100.2 +TT | -98.1 +TT | -96.9 +TT | -95.7 +TT |  |  |  |  |  |
| NOTE 1: Four Rx antenna ports shall be the baseline for above listed operating band except for two Rx vehicular UE. Four Rx antenna ports for RedCap UE is not supported for this operating band.  NOTE 2 The requirement is modified by -0.5 dB when the assigned UE channel bandwidth is confined within 3300 - 3800 MHz.  NOTE 3: For these bandwidths, the minimum requirements are restricted to operation when carrier is configured as a downlink carrier part of CA configuration.  NOTE 4: TT for each frequency and channel bandwidth is specified in Table 7.3.2.5-3. | | | | | | | | | | | | |

Table 7.3.2.5-2b: Four antenna port Reference sensitivity QPSK PREFSENS for TDD, SDL and FDD with variable duplex operation bands for PC3, PC2, PC1.5

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Operating band / SCS / Channel bandwidth / REFSENS | | | | |
| Operating band | SCS  (kHz) | Channel bandwidth (MHz) | REFSENS (dBm)8 | Duplex Mode |
| n34 | 15 | 5, 10, 15 | -100 + 10log10(NRB/25)-2.7 +TT | TDD |
| 30 | 10, 15 | -97.1 + 10log10(NRB/24)+-2.7 TT |
| 60 | 10, 15 | -97.5 + 10log10(NRB/11)-2.7 +TT |
| n381 | 15 | 5, 10, 15, 20, 25, 30, 40 | -100 + 10log10(NRB/25)-2.7 +TT | TDD |
| 30 | 10, 15, 20, 25, 30, 40 | -97.1 + 10log10(NRB/24)-2.7 +TT |
| 60 | 10, 15, 20, 25, 30, 40 | -97.5 + 10log10(NRB/11)-2.7 +TT |
| n39 | 15 | 5, 10, 15, 20, 25, 30, 40 | -100 + 10log10(NRB/25)-2.7 +TT | TDD |
| 30 | 10, 15, 20, 25, 30, 40 | -97.1 + 10log10(NRB/24)-2.7 +TT |
| 60 | 10, 15, 20, 25, 30, 40 | -97.5 + 10log10(NRB/11)-2.7 +TT |
| n40 | 15 | 5, 10, 15, 20, 25, 30, 40, 50 | -100 + 10log10(NRB/25) -2.7 +TT | TDD |
| 30 | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100 | -97.1 + 10log10(NRB/24)-2.7 +TT |
| 60 | 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100 | -97.5 + 10log10(NRB/11)-2.7 +TT |
| n411 | 15 | 5, 10, 15, 20, 30, 40, 50 | -94.8 + 10log10(NRB/52)-2.7 +TT | TDD |
| 30 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 | -95.1 + 10log10(NRB/24)-2.7 +TT |
| 60 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100 | -95.5 + 10log10(NRB/11)-2.7 +TT |
| n481 | 15 | 5, 10, 15, 20, 30, 40, 505 | -99 + 10log10(NRB/25)-2.2 +TT | TDD |
| 30 | 10, 15, 20, 40, 505, 605, 705, 805, 905, 1005 | -96.1 + 10log10(NRB/24)-2.2 +TT |
| 60 | 10, 15, 20, 40, 505, 605, 705, 805, 905, 1005 | -96.5 + 10log10(NRB/11)-2.2+TT |
| n771,4 | 15 | 10, 15, 20, 25, 30, 40, 50 | -95.3 + 10log10(NRB/52)-2.2 +TT | TDD |
| 30 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | -95.6 + 10log10(NRB/24)-2.2 +TT |
| 60 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | -96.0 + 10log10(NRB/11)-2.2 +TT |
| n781 | 15 | 10, 15, 20, 25, 30, 40, 50 | -95.8 + 10log10(NRB/52)-2.2 +TT | TDD |
| 30 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | -96.1 + 10log10(NRB/24)-2.2 +TT |
| 60 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | -96.5 + 10log10(NRB/11)-2.2 +TT |
| n791 | 15 | 10, 20, 40, 50 | -95.8 + 10log10(NRB/52)-2.2 +TT | TDD |
| 30 | 10, 20, 40, 50, 60, 80, 100 | -96.1 + 10log10(NRB/24)-2.2 +TT |
| 60 | 10, 20, 40, 50, 60, 80, 100 | -96.5 + 10log10(NRB/11)-2.2 +TT |
| NOTE 1: Four Rx antenna ports shall be the baseline for this operating band except for two Rx vehicular UE. Four Rx antenna ports for RedCap UE is not supported for this operating band.  NOTE 2: The transmitter shall be set to PUMAX as defined in clause 6.2.4.  NOTE 3: Void  NOTE 4: The requirement is modified by -0.5 dB when the assigned UE channel bandwidth is confined within 3300 - 3800 MHz.  NOTE 5: For these bandwidths, the minimum requirements are restricted to operation when carrier is configured as a downlink carrier part of CA configuration.  NOTE 6: Void  NOTE 7: For SDL bands, the reference sensitivity requirements shall be verified by inter-band CA combinations with SDL band, which are supported by UE.  NOTE 8: The REFSENS value is rounded to the nearest number down to one decimal point. “NRB” in REFSENS formula is the maximum transmission bandwidth configuration as defined in Table 5.3.2-1.  NOTE 9: TT for each frequency and channel bandwidth is specified in Table 7.3.2.5-3. | | | | |

<< UNCHANGED PARTS SKIPPED >>

### 7.3A.1\_1 Reference sensitivity power level for 2DL CA exceptions

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

- Test point analysis for CA\_n3A-n5A IMD2 and IMD4 is currently missing in TR 38.905.

7.3A.1\_1.1 Test purpose

To verify the ability of UE that support CA to receive data with a given average throughput for a specified reference measurement channel, under conditions of low signal level, ideal propagation and no added noise when CA exceptions are allowed.

A UE unable to meet the throughput requirement under these conditions will decrease the effective coverage area.

7.3A.1\_1.2 Test applicability

This test case applies to all types of NR UE release 15 and forward that support NR 2DL CA

7.3A.1\_1.3 Minimum requirements

The minimum conformance requirements are defined in clause 7.3A.0.

<< UNCHANGED PARTS SKIPPED >>

Table 7.3I.2.5-4: Single antenna port reference sensitivity QPSK PREFSENS for TDD, SDL and FDD with variable duplex operation bands

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Operating band / SCS / Channel bandwidth / REFSENS/Duplex Mode | | | | |
| Operating band | SCS  kHz | Channel bandwidth (MHz) | REFSENS (dBm)8 | Duplex Mode |
| n34 | 15 | 5, 10, 15 | -100 + 10log10(NRB/25) +2.5+TT | TDD |
| 30 | 10, 15 | -97.1 + 10log10(NRB/24) +2.5+TT |
| 60 | 10, 15 | -97.5 + 10log10(NRB/11) +2.5+TT |
| n381 | 15 | 5, 10, 15, 20 | -100 + 10log10(NRB/25) +2.5+TT | TDD |
| 30 | 10, 15, 20 | -97.1 + 10log10(NRB/24) +2.5+TT |
| 60 | 10, 15, 20 | -97.5 + 10log10(NRB/11) +2.5+TT |
| n39 | 15 | 5, 10, 15, 20 | -100 + 10log10(NRB/25) +2.5+TT | TDD |
| 30 | 10, 15, 20 | -97.1 + 10log10(NRB/24) +2.5+TT |
| 60 | 10, 15, 20 | -97.5 + 10log10(NRB/11) +2.5+TT |
| n40 | 15 | 5, 10, 15, 20 | -100 + 10log10(NRB/25) +2.5+TT | TDD |
| 30 | 10, 15, 20 | -97.1 + 10log10(NRB/24) +2.5+TT |
| 60 | 10, 15, 20 | -97.5 + 10log10(NRB/11) +2.5+TT |
| n411 | 15 | 5, 10, 15, 20 | -94.8 + 10log10(NRB/52) +2.5+TT | TDD |
| 30 | 10, 15, 20 | -95.1 + 10log10(NRB/24) +2.5+TT |
| 60 | 10, 15, 20 | -95.5 + 10log10(NRB/11) +2.5+TT |
| n481 | 15 | 5, 10, 15, 20 | -99 + 10log10(NRB/25) +2.5+TT | TDD |
| 30 | 10, 15, 20 | -96.1 + 10log10(NRB/24) +2.5+TT |
| 60 | 10, 15, 20 | -96.5 + 10log10(NRB/11) +2.5+TT |
| n50 | 15 | 5, 10, 15, 20 | -100 + 10log10(NRB/25) +2.5+TT | TDD |
| 30 | 10, 15, 20 | -97.1 + 10log10(NRB/24) +2.5+TT |
| 60 | 10, 15, 20 | -97.5 + 10log10(NRB/11) +2.5+TT |
| n51 | 15 | 5 | -100 +2.5+TT | TDD |
| n53 | 15 | 5, 10 | -100 + 10log10(NRB/25) +2.5+TT | TDD |
| 30 | 10 | -97.1 +2.5+TT |
| 60 | 10 | -97.5 +2.5+TT |
| n771,4 | 15 | 10, 15, 20 | -95.3 + 10log10(NRB/52) +2.5+TT | TDD |
| 30 | 10, 15, 20 | -95.6 + 10log10(NRB/24) +2.5+TT |
| 60 | 10, 15, 20 | -96.0 + 10log10(NRB/11) +2.5+TT |
| n781 | 15 | 10, 15, 20 | -95.8 + 10log10(NRB/52) +2.5+TT | TDD |
| 30 | 10, 15, 20 | -96.1 + 10log10(NRB/24) +2.5+TT |
| 60 | 10, 15, 20 | -96.5 + 10log10(NRB/11) +2.5+TT |
| n791 | 15 | 10, 20, | -95.8 + 10log10(NRB/52) +2.5+TT | TDD |
| 30 | 10, 20, | -96.1 + 10log10(NRB/24) +2.5+TT |
| 60 | 10, 20 | -96.5 + 10log10(NRB/11) +2.5+TT |
| n91 | 15 | 5 | -100+2.5+TT | FDD |
| n92 | 15 | 5,10,15,20 | -100 + 10log10(NRB/25) +2.5+TT | FDD |
| 30 | 10,15,20 | -97.1 + 10log10(NRB/24) +2.5+TT |
| n93 | 15 | 5 | -100 +2.5+TT | FDD |
| n94 | 15 | 5,10,15,20 | -100 + 10log10(NRB/25) +2.5+TT | FDD |
|  | 30 | 10,15,20 | -97.1 + 10log10(NRB/24) +2.5+TT |
| n101 | 15 | 5, 10 | -100 + 10log10(NRB/25) +2.5+TT | TDD |
|  | 30 | 10 | -97.1 + 10log10(NRB/24) +2.5+TT |  |
| NOTE 1: Void.  NOTE 2: The transmitter shall be set to PUMAX as defined in clause 6.2.4.  NOTE 3: Void  NOTE 4: The requirement is modified by -0.5 dB when the assigned UE channel bandwidth is confined within 3300 - 3800 MHz.  NOTE 5: Void  NOTE 6: Void  NOTE 7: Void  NOTE 8: The REFSENS value is rounded to the nearest number down to one decimal point. “NRB” in REFSENS formula is the maximum transmission bandwidth configuration as defined in Table 5.3.2-1.  NOTE 9: TT for each frequency and channel bandwidth is specified in Table 7.3I.2.5-7. | | | | |

<< UNCHANGED PARTS SKIPPED >>

Table 7.3I.3.4.1-2: Uplink configuration for reference sensitivity of FDD or TDD eRedCap UE not supporting IE *eRedCapNotReducedBB-BW-r18*, LCRB @ RBstart format

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Operating  Band | SCS  (kHz) | 5  MHz | 10  MHz | 15  MHz | 20  MHz | Duplex  Mode |
| n1 | 15 | 25@0 | 25@14 | 25@27 | 25@41 | FDD |
| 30 |  | 12@6 | 12@13 | 12@20 |
| n2 | 15 | 25@0 | 25@14 | 25@27 | 25@41 | FDD |
| 30 | 10@11 | 12@6 | 12@13 | 12@20 |
| n3 | 15 | 25@0 | 25@14 | 25@27 | 25@41 | FDD |
| 30 |  | 12@6 | 12@13 | 12@20 |
| n5 | 15 | 25@0 | 25@14 | 25@27 | 25@41 | FDD |
| 30 |  | 10@81 | 10@151 | 10@221 |
| n7 | 15 | 25@0 | 25@14 | 25@27 | 25@41 | FDD |
| 30 |  | 12@6 | 12@13 | 12@20 |
| n8 | 15 | 25@0 | 25@14 | 25@27 | 25@41 | FDD |
| 30 |  | 10@81 | 10@151 | 10@221 |
| n12 | 15 | 20@51 | 20@191 | 20@321 |  | FDD |
| 30 |  | 10@81 | 10@151 |  |
| n13 | 15 | 20@01 | 20@141 |  |  | FDD |
| 30 |  | 10@61 |  |  |
| n14 | 15 | 20@01 | 20@141 |  |  | FDD |
| 30 |  | 10@61 |  |  |
| n20 | 15 | 25@0 | 20@141 | 20@27 | 20@41 | FDD |
| 30 |  | 10@61 | 10@132 | 10@202 |
| n24 | 15 | 25@0 | 25@14 |  |  | FDD |
| 30 |  | 12@6 |  |  |
| n25 | 15 | 25@0 | 25@14 | 25@27 | 25@41 | FDD |
| 30 |  | 12@6 | 12@13 | 12@20 |
| n26 | 15 | 25@0 | 25@14 | 25@27 | 25@41 | FDD |
| 30 |  | 12@6 | 12@13 | 12@20 |
| n28 | 15 | 25@0 | 25@14 | 25@27 | 25@41 | FDD |
| 30 |  | 10@81 | 10@151 | 10@221 |
| n30 | 15 | 20@51 | 20@191 |  |  | FDD |
| 30 |  | 10@81 |  |  |
| n34 | 15 | 25@0 | 25@14 | 25@27 |  | TDD |
| 30 |  | 12@6 | 12@13 |  |
| n38 | 15 | 25@0 | 25@14 | 25@27 | 25@41 | TDD |
| 30 |  | 12@6 | 12@13 | 12@20 |
| n39 | 15 | 25@0 | 25@14 | 25@27 | 25@41 | TDD |
| 30 |  | 12@6 | 12@13 | 12@20 |
| n40 | 15 | 25@0 | 25@14 | 25@27 | 25@41 | TDD |
| 30 |  | 12@6 | 12@13 | 12@20 |
| n41 | 15 | 25@0 | 25@14 | 25@27 | 25@41 | TDD |
| 30 |  | 12@6 | 12@13 | 12@20 |
| n48 | 15 | 25@0 | 25@14 | 25@27 | 25@41 | TDD |
| 30 |  | 12@6 | 12@13 | 12@20 |
| n50 | 15 | 25@0 | 25@14 | 25@27 | 25@41 | TDD |
| 30 |  | 12@6 | 12@13 | 12@20 |
| n51 | 15 | 25@0 |  |  |  | TDD |
| 30 |  |  |  |  |
| n53 | 15 | 25@0 | 25@14 |  |  | TDD |
| 30 |  | 12@6 |  |  |
| n65 | 15 | 25@0 | 25@14 | 25@27 | 25@41 | FDD |
| 30 |  | 12@6 | 12@13 | 12@20 |
| n66 | 15 | 25@0 | 25@14 | 25@27 | 25@41 | FDD |
| 30 |  | 12@6 | 12@13 | 12@20 |
| n70 | 15 | 25@0 | 25@14 | 25@27 | NOTE 3 | FDD |
| 30 |  | 12@6 | 12@13 | NOTE 3 |
| n71 | 15 | 25@0 | 25@14 | 20@321 | 20@411 | FDD |
| 30 |  | 12@6 | 10@151 | 10@201 |
| n74 | 15 | 25@0 | 25@14 | 25@27 | 25@41 | FDD |
| 30 |  | 10@81 | 10@151 | 10@221 |
| n77 | 15 |  | 25@14 | 25@27 | 25@41 | TDD |
| 30 |  | 12@6 | 12@13 | 12@20 |
| n78 | 15 |  | 25@14 | 25@27 | 25@41 | TDD |
| 30 |  | 12@6 | 12@13 | 12@20 |
| n79 | 15 |  | 25@14 |  | 25@41 | TDD |
| 30 |  | 12@6 |  | 12@20 |
| n85 | 15 | 20@51 | 20@191 | 20@321 |  | FDD |
| 30 |  | 10@81 | 10@151 |  |
| n91 | 15 | 25@04 | 20@191, 4 |  |  | FDD |
| 30 |  |  |  |  |
| n92 | 15 | 20@51 | 20@191 | 20@321 | 20@411 | FDD |
| 30 |  | 10@81 | 10@151 | 10@201 |
| n93 | 15 | 25@04 | 25@144 |  |  | FDD |
| 30 |  |  |  |  |
| n94 | 15 | 25@0 | 25@14 | 20@321 | 20@411 | FDD |
| 30 |  | 12@6 | 10@151 | 10@201 |
| n100 | 15 | 25@0 |  |  |  | FDD |
| 30 |  |  |  |  |
| n101 | 15 | 25@0 | 25@14 |  |  | TDD |
| 30 |  | 12@6 |  |  |
| NOTE 1: UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.3.2-1).  NOTE 2: For band n20; for 15kHz SCS, in the case of 15MHz channel bandwidth, the UL resource blocks shall be located at RBstart =11 and in the case of 20MHz channel bandwidth, the UL resource blocks shall be located at RBstart =16; for 30kHz SCS, in the case of 15MHz channel bandwidth, the UL resource blocks shall be located at RBstart =6 and in the case of 20MHz channel bandwidth, the UL resource blocks shall be located at RBstart =8.  NOTE 3: For DL channel bandwidths that do not have symmetric UL channel bandwidth, highest valid UL configuration with lowest duplex distance shall be used.  NOTE 4: For band n91 and n93, largest supported UL bandwidth configuration shall be used. | | | | | | |

<< UNCHANGED PARTS SKIPPED >>

Table 7.3I.3.5-4: Single antenna port reference sensitivity QPSK PREFSENS for TDD, SDL and FDD with variable duplex operation bands

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Operating band / SCS / Channel bandwidth / REFSENS/Duplex Mode | | | | |
| Operating band | SCS  kHz | Channel bandwidth (MHz) | REFSENS (dBm)8 | Duplex Mode |
| n34 | 15 | 5, 10, 15 | -100 +2.5+TT | TDD |
| 30 | 10, 15 | -97.1 +2.5 -3+TT |
| n381 | 15 | 5, 10, 15, 20 | -100 +2.5+TT | TDD |
| 30 | 10, 15, 20 | -97.1 +2.5 -3+TT |
| n39 | 15 | 5, 10, 15, 20 | -100 +2.5+TT | TDD |
| 30 | 10, 15, 20 | -97.1 +2.5 -3+TT |
| n40 | 15 | 5, 10, 15, 20 | -100 +2.5+TT | TDD |
| 30 | 10, 15, 20 | -97.1 +2.5 -3+TT |
| n411 | 15 | 5, 10, 15, 20 | -94.8 +2.5+TT | TDD |
| 30 | 10, 15, 20 | -95.1 +2.5 -3+TT |
| n481 | 15 | 5, 10, 15, 20 | -99 +2.5+TT | TDD |
| 30 | 10, 15, 20 | -96.1+2.5 -3+TT |
| n50 | 15 | 5, 10, 15, 20 | -100 +2.5+TT | TDD |
| 30 | 10, 15, 20 | -97.1 +2.5 -3+TT |
| n51 | 15 | 5 | -100 +2.5+TT | TDD |
| n53 | 15 | 5, 10 | -100 +2.5+TT | TDD |
| 30 | 10 | -97.1 +2.5 -3+TT |
| n771,4 | 15 | 10, 15, 20 | -95.3 +2.5 -3.2 +TT | TDD |
| 30 | 10, 15, 20 | -95.6 +2.5 -3 +TT |
| n781 | 15 | 10, 15, 20 | -95.8 +2.5 -3.2+TT | TDD |
| 30 | 10, 15, 20 | -96.1 +2.5 -3 +TT |
| n791 | 15 | 10, 20, | -95.8 +2.5+TT | TDD |
| 30 | 10, 20, | -96.1 +2.5 -3+TT |
| n91 | 15 | 5 | -100+2.5+TT | FDD |
| n92 | 15 | 5,10,15,20 | -100 +2.5+TT | FDD |
| 30 | 10,15,20 | -97.1 +2.5 -3+TT |
| n93 | 15 | 5 | -100 +2.5+TT | FDD |
| n94 | 15 | 5,10,15,20 | -100 +2.5+TT | FDD |
|  | 30 | 10,15,20 | -97.1 +2.5 -3+TT |
| n101 | 15 | 5, 10 | -100 +2.5+TT | TDD |
|  | 30 | 10 | -97.1 +2.5 -3+TT |  |
| NOTE 1: Void.  NOTE 2: The transmitter shall be set to PUMAX as defined in clause 6.2.4.  NOTE 3: Void  NOTE 4: The requirement is modified by -0.5 dB when the assigned UE channel bandwidth is confined within 3300 - 3800 MHz.  NOTE 5: Void  NOTE 6: Void  NOTE 7: Void  NOTE 8: The REFSENS value is rounded to the nearest number down to one decimal point. “NRB” in REFSENS formula is the maximum transmission bandwidth configuration as defined in Table 5.3.2-1.  NOTE 9: TT for each frequency and channel bandwidth is specified in Table 7.3I.3.5-7. | | | | |

<< END OF CHANGES >>