**3GPP TSG-RAN WG4 Meeting #103-e *R4-221xxxx***

**Electronic Meeting, May 09 - May 20, 2022**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **38.101-1** | **CR** | **<CR#>** | **rev** | **-** | **Current version:** | **16.11.0** |  |
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| *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:*** | Big CR for TS 38.101-1 Maintenance Part-1 (Rel-16) | | | | | | | | | |
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| ***Source to WG:*** | MCC, vivo | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_band\_n65-Core  NR\_n7\_BW  TEI16  5G\_V2X\_NRSL  NR\_unlic-Core  LTE\_NR\_DC\_CA\_enh  NR\_eMIMO  NR\_newRAT-Core  DC\_R16\_xBLTE\_2BNR\_yDL2UL-Core  HPUE\_PC1\_5\_n77\_n78-Core  NR\_SUL\_combos\_R16-Core  NR\_CADC\_R16\_2BDL\_xBUL-Core  5G\_V2X\_NRSL-Core | | | | |  | ***Date:*** | | | 2022-05-24 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *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:*** | | This big CRs merge the mutile endorsed draf CRs. The reason for change in each endorsed draft CR is copied below.  R4-2207866 draft CR: Update of UE capability name for Tx switching  Update of UE capability name, according to the latest RAN2 specifications.  R4-2207886 CR for 38.101-1-gb0: Correction for n7 A-MPR (NS\_46)  There is a typo error in the Carrier Center Frequency conditions for channel bandwidth 25 MHz: For all channel bandwidths except 25 MHz, the upper limit of carrier center frequency is defined as UL upper limit for band n7 (2570 MHz) – BW/2 (including this edge carrier center frequency). In the case of 25 MHz, the edge value is the same but the symbol in the equation is < instead of ≤, i.e. excluding the edge carrier center frequency  R4-2207998 CR for 38.101-1 Rel16 Minor AMPR Corrections for n65 to account for SCS  10, 15, 20MHz AMPR CIM5 region boundary only covers allocations with 15KHz SCS and not for 30KHz and 60KHz SCS  R4-2208596 Miscelleous corrections on A-MPR requirements for Intra-band CA  There are a number of minor issues need to update, such as:   * The title level for 6.2A.3.1.2 and 6.2A.3.1.3 including sub-clauses are not correct * Hanging paragraphs in 6.2A.3.1.2; * Duplicate definition of LCRB\_alloc, 1 and 2; * Redudant defintion of B in multiple clauses * Square brackets remain in certain requirements   R4-2208665 draft CR to TS38.101-1[R16] Some Corrections for Transmitter and Receiver characteristics  ***For the first change:***  There exists lots of incorrect reference tables or clause numbers in the specification.  ***For the second change:***  Repeated or redundant words should be removed to ensure the normative nature of the TS.  ***For the third change:***  The typo of “DFT-s-ODFM” should be revised as “DFT-s-OFDM”.  ***For the fourth change:***  Some spelling typos should be corrected.  R4-2208694 Draft CR to 38.101-1: Correction on MSD value for DC\_1A-8A\_n78A and DC\_1A\_n8A-n78A  The MSD value for DC\_1A-8A\_n78A in Rel-16 TS38.101-3 is not aligned with Rel-15 spec. Therefore, the MSD values in Rel-16 spec should be corrected to align with the R4-22XXXXX.  In addition, the UL Fc and DL Fc shall be the same for band n78 in DC\_1A\_n8A-n78A  R4-2208743 Definition of PC1.5 and applicability of extensions of power-class parameters (RRC)  Define UE power class 1.5 for Rel-16. This cannot be defined by a note in a table (NOTE 5).  In clause 6.1 it is specified that transmitter requirements apply per connector unless otherwise stated. TxD indication with the associated verifcation across two connectors (suffix G in the Rel-17 version) is not mandatory for PC1.5.  Clarify applicability of extended versions of power-control parameters in 38.331 (e.g. ue-PowerClass-r1610 for PC1.5)  R4-2209151 Draft CR to add ‘Annex G Difference of relative phase and power errors’ for FR1 UL coherent MIMO R4-2209311 draftCR for TS 38.101-1 Rel-16: Corrections on Single Bands Coex  The NR and E-UTRA bands (n)7 and n79 are used in the same regions and combinations such as DC\_7A\_n79A were requested by operators and introduced to the specifications. However, for band n7 the band n79 is currently missing in the protected band list and and for band n79 the band 7 is currently missing. (Using same WI code as R4-1816196)  R4-2209335 Draft CR for 38.101-1 to add note 5 for band n83(R16)  The dual duplexer implementation for band n28 is reused for band n83. The note 5 should be clarified for band n83 20MHz.  R4-2210688 Draft CR for 38.101-1 to clarify the restriction of band n28 for CA\_n20-n28(R16)  The frequency restriction of band n28 should be clarified for some higher order band combinations of which CA\_n20-n28 is a subset.  R4-2209342 Draft CR for 38.101-1 to add the missing simultaneous Rx/Tx capability for SUL band combinations (R16)  To add the missing simultaneous RxTx capability for SUL band combinations SUL\_n41-n80/ SUL\_n41-n81/ SUL\_n41-n95/ SUL\_n79-n84/ SUL\_n79-n95, since the corresponding CA band combinations CA\_n3-n41/ CA\_n8-n41/ CA\_n1-n79/ CA\_n34-n79 can support simultaneous RxTx capability technically.  R4-2210689 Draft CR for 38.101-1 to mainteinance NR V2X UE spec (R16)   1. Note 10 in table 5.3.5-1 may lead misunderstanding for licensed bands which can support sidelink. 2. UE MOP for V2X was referred to general clause 6.2.1. It may result some ambiguities when new power class is only introduced for Uu interface in licensed bands which can support sidelink. 3. Based on the configured transmitted power for V2X con-current operation, there is no need to specify UE power class for NR V2X inter-band con-current band combinations. Con-current operation should be clarified. 4. The frequency error requirments of SL MIMO are not correct.   R4-2211162 draft CR for TS 38.101-1: correction for DC location reporting (R16 cat-F)  New DC reporting signalings were introduced in Rel-16 for intra-band UL CA. For affected requirements, e.g. IBE, carrier leakage, if the new signaling is not indicated, the legacy DC location reporting signalings are still available to be used, which should be clear in the specification.  R4-2210687 Draft CR to 38.101-1 R16 adding the missing additional spurious emission requirement for CA\_NC\_NS\_04  The additional spurious emission requirement for CA\_NC\_NS\_04 is missing in current spec.  R4-2209350 Draft CR for 38.101-1 to add exception clause for inter-band CA REFSENS (R16)  The exceptional clauses 7.3A.5 and 7.3A.6 are missing in clause 7.3A.2.3  R4-2210202 Correction to out-of-band blocking ranges  Errors in out-of-band blocking ranges for Bands n77,n78, and n79. The cutoff frequency is 150 MHz between range 2 and range 3, but that is specified as applicable for channel bandwidths ≥ 40 MHz. The applicability should be for channel bandwidths strictly > 40 MHz, since 3\*CBW would be 120 MHz for a 40 MHz channel.  R4-2210209 Applicability of requirements for NS\_xxU  Requirements are unclear when NS\_xxU is signalled  R4-2210205 Configured maximum power in the absence of p-maxEUTRA and p-NR-FR1  Requirements are unclear if *p-maxEUTRA* and *p-NR-FR1* are not indicated | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | The summary of change in each each endorsed draft CR is copied below.  R4-2207866 draft CR: Update of UE capability name for Tx switching  Update of UE capability name.  R4-2207886 CR for 38.101-1-gb0: Correction for n7 A-MPR (NS\_46)  Modify equation defining the carrier center frequency condition for channel bandwidth equal to 25 MHz as 2534.5 MHz ≤ Fc ≤ 2557.5 MHz  R4-2207998 CR for 38.101-1 Rel16 Minor AMPR Corrections for n65 to account for SCS  Modify boundary values to cover 30KHz and 60KHz SCS and not just 15KHz SCS for CIM5 coverage.   1. 10MHz BW: Modify >7.38 to ≥7.2 in region B and ≤7.38 to <7.2 in region C for Fc=1995MHz 2. 15MHz BW: Modify >11.34 to ≥10.8 in region B and ≤11.34 to <10.8 in region C for Fc=1987.5MHz   20MHz BW: Modify >13.32 to ≥12.96 in region A and ≤13.32 to <12.96 in region C for Fc=1990MHz  R4-2208596 Miscelleous corrections on A-MPR requirements for Intra-band CA  Other revisions:   * Change title levels of 6.2A.3.1.2 and 6.2A.3.1.3 including sub-clauses * Adding clause titile 6.2A.3.1.2.0 to aviod hanging paragraphs. * Revise the LCRB\_alloc, 1/2 to LCRB1/2 which is consistent to most of the spec; * Move definition of B in general section. * Square brackets remain in certain requirements   R4-2208665 draft CR to TS38.101-1[R16] Some Corrections for Transmitter and Receiver characteristics  Correct the incorrect reference table numbers or clause numbers, and also correct some typos and remove some repeated words.  R4-2208694 Draft CR to 38.101-1: Correction on MSD value for DC\_1A-8A\_n78A and DC\_1A\_n8A-n78A  Correction on MSD value for DC\_1A-8A\_n78A and DC\_1A\_n8A-n78A  R4-2208743 Definition of PC1.5 and applicability of extensions of power-class parameters (RRC)  Define UE power class 1.5 for Rel-16. This cannot be defined by a note in a table (NOTE 5).  In clause 6.1 it is specified that transmitter requirements apply per connector unless otherwise stated. TxD indication with the associated verifcation across two connectors (suffix G in the Rel-17 version) is not mandatory for PC1.5.  Clarify applicability of extended versions of power-control parameters in 38.331 (e.g. ue-PowerClass-r1610 for PC1.5)  R4-2209151 Draft CR to add ‘Annex G Difference of relative phase and power errors’ for FR1 UL coherent MIMO  The 6.4D.4 Requirements for coherent UL MIMO specify maximum difference of relative phase and power errors, parameters not yet tested in other sections of 38.101-1 or previous 3GPP RATs. It is then necessary to give further details to RAN5 and TE vendors in an annex as done for the EVM so that what is to be measured is made clear and can be implemented as intended.  R4-2209311 draftCR for TS 38.101-1 Rel-16: Corrections on Single Bands Coex  The following modifications are made:  1. n7: Band n79 is added as protected band to UE co-existence list.  2. n79: Band 7 is added as protected band to UE co-existence list.  R4-2209335 Draft CR for 38.101-1 to add note 5 for band n83(R16)  Note 5 is added for band n83.  R4-2210688 Draft CR for 38.101-1 to clarify the restriction of band n28 for CA\_n20-n28(R16)  The clarification “For a higher order band combination of which CA\_n20-n28 is a subset, the frequency range in band n28 is restricted for the higher order band combination to 703-733 MHz for the UL and 758-788 MHz for the DL.” is added to solve this issue.  R4-2209342 Draft CR for 38.101-1 to add the missing simultaneous Rx/Tx capability for SUL band combinations (R16)  To add the missing simultaneous RxTx capability for SUL band combinations SUL\_n41-n80/ SUL\_n41-n81/ SUL\_n41-n95/ SUL\_n79-n84/ SUL\_n79-n95.  R4-2210689 Draft CR for 38.101-1 to mainteinance NR V2X UE spec (R16)   1. Note 10 in table 5.3.5-1 is improved. A new table is created in clause 5.3E.1-1. 2. A new table is created for V2X UE MOP in clause 6.2E.1.1-0. 3. Power Class requirements for NR V2X inter-band con-current combination are clarified in clause 6.2E.1.2. 4. For frequency error requirments of SL MIMO, the 0.5ms measurement period is corrected by 1ms   R4-2211162 draft CR for TS 38.101-1: correction for DC location reporting (R16 cat-F)  Clarfiry in the spec that if the new DC location reporting signaling is not indicated, the legacy signalings are still available to be used.  R4-2210687 Draft CR to 38.101-1 R16 adding the missing additional spurious emission requirement for CA\_NC\_NS\_04  The subclause 6.5A.3.3.2.1 on defining the additional spurious emission requirement for CA\_NC\_NS\_04 is added based on the agreed CR R4-2016815  R4-2209350 Draft CR for 38.101-1 to add exception clause for inter-band CA REFSENS (R16)  The exceptional clauses 7.3A.5 and 7.3A.6 are added in clause 7.3A.2.3.  R4-2210202 Correction to out-of-band blocking ranges  Correction to frequency ranges where the out-of-band blocking requirements apply. Other editorial errors for consistency.  R4-2210209 Applicability of requirements for NS\_xxU  Clarification is made that requirements associated with NS\_03, NS\_05, NS\_43 also apply when NS\_03U, NS\_05U, and NS\_43U, respectively, are signaled.  R4-2210205 Configured maximum power in the absence of p-maxEUTRA and p-NR-FR1  Pcmax limits are computed without these parameters in the minimization equations if they are not present. Their value is set to infinity when not indicated. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The consequences if not approved for each endorsed draft CR are coppied below.  R4-2207866 draft CR: Update of UE capability name for Tx switching  The RAN2 and RAN4 specifications are not aligned.  R4-2207886 CR for 38.101-1-gb0: Correction for n7 A-MPR (NS\_46)  Appropriate A-MPR NS\_46 requirement won’t be allowed to carrier center frequency equal to 2557.5 if channel bandwidth is 25 MHz.  R4-2207998 CR for 38.101-1 Rel16 Minor AMPR Corrections for n65 to account for SCS  UE cannot meet AMPR for 30KHz and 60KHz SCS  R4-2208596 Miscelleous corrections on A-MPR requirements for Intra-band CA  A number of issues would be stayed in Rel-16 spec.  R4-2208665 draft CR to TS38.101-1[R16] Some Corrections for Transmitter and Receiver characteristics  Typos and incorrect reference tables or clause numbers would exist in the specfication, which may cause misunderstanding  R4-2208694 Draft CR to 38.101-1: Correction on MSD value for DC\_1A-8A\_n78A and DC\_1A\_n8A-n78A  Inconsistency between specifications happen.  R4-2208743 Definition of PC1.5 and applicability of extensions of power-class parameters (RRC)  The UE power class 1.5 is not defined for Rel-16.  R4-2209151 Draft CR to add ‘Annex G Difference of relative phase and power errors’ for FR1 UL coherent MIMO  Unclear clause 6.4D.4 leading to misinterpretations  R4-2209311 draftCR for TS 38.101-1 Rel-16: Corrections on Single Bands Coex  UE coexistence requirements for single bands n7 and n79 remain inconsistent.  R4-2209335 Draft CR for 38.101-1 to add note 5 for band n83(R16)  Current spec didn’t reflect the implementation of band n83.  R4-2210688 Draft CR for 38.101-1 to clarify the restriction of band n28 for CA\_n20-n28(R16)  The frequency restriction of band n28 is missing for some higher order band combinations of which CA\_n20-n28 is a subset.  R4-2209342 Draft CR for 38.101-1 to add the missing simultaneous Rx/Tx capability for SUL band combinations (R16)  The simultaneous RxTx capabilities for SUL band combinations SUL\_n41-n80/ SUL\_n41-n81/ SUL\_n41-n95/ SUL\_n79-n84/ SUL\_n79-n95 are missing.  R4-2210689 Draft CR for 38.101-1 to mainteinance NR V2X UE spec (R16)   1. Note 10 in table 5.3.5-1 may lead misunderstanding for licensed bands which can support sidelink. 2. UE MOP for V2X was referred to general clause 6.2.1. It may result some ambiguities when new power class is only introduced for Uu interface in licensed bands which can support sidelink. 3. Based on the configured transmitted power for V2X con-current operation, there is no need to specify UE power class for NR V2X inter-band con-current band combinations. Con-current operation should be clarified. 4. The frequency error requirments of SL MIMO are not correct.   R4-2211162 draft CR for TS 38.101-1: correction for DC location reporting (R16 cat-F)  DC location reporting mechanism is ambigous for the case where the new DC location capability is not indicated.  R4-2210687 Draft CR to 38.101-1 R16 adding the missing additional spurious emission requirement for CA\_NC\_NS\_04  The requirements for CA\_n41(2A) is incomplete  R4-2209350 Draft CR for 38.101-1 to add exception clause for inter-band CA REFSENS (R16)  The exceptional clauses 7.3A.5 and 7.3A.6 are still missing in clause 7.3A.2.3.  R4-2210202 Correction to out-of-band blocking ranges  Out-of-band blocking ranges are incorrectly specified.  R4-2210209 Applicability of requirements for NS\_xxU  Emission requirements are unclear.  R4-2210205 Configured maximum power in the absence of p-maxEUTRA and p-NR-FR1  Requirements are unclear. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | R4-2207866 draft CR: Update of UE capability name for Tx switching  6.4D.4  R4-2207886 CR for 38.101-1-gb0: Correction for n7 A-MPR (NS\_46)  6.2.3.17  R4-2207998 CR for 38.101-1 Rel16 Minor AMPR Corrections for n65 to account for SCS  6.2.3.15  R4-2208596 Miscelleous corrections on A-MPR requirements for Intra-band CA  6.2A.3.1.2, 6.2A.3.1.3  R4-2208665 draft CR to TS38.101-1[R16] Some Corrections for Transmitter and Receiver characteristics  6.2E, 6.2F, 6.3A, 6.3F, 6.4A, 6.4D, 6.5A, 7.5F, 7.6F, 7.7B, 7.8E  R4-2208694 Draft CR to 38.101-1: Correction on MSD value for DC\_1A-8A\_n78A and DC\_1A\_n8A-n78A  7.3B.2.3.5.2  R4-2208743 Definition of PC1.5 and applicability of extensions of power-class parameters (RRC)  6.1, 6.2.1, 6.3.1, 6.3.4.1, 6.4.2.1, 6.4.2.4, 6.5.1, 6.5.2.1, 6.5.3, 6.5.4  R4-2209151 Draft CR to add ‘Annex G Difference of relative phase and power errors’ for FR1 UL coherent MIMO  G, G.0, G.1, G.2.  R4-2209311 draftCR for TS 38.101-1 Rel-16: Corrections on Single Bands Coex  6.5.3.2  R4-2209335 Draft CR for 38.101-1 to add note 5 for band n83(R16)  5.3.5  R4-2210688 Draft CR for 38.101-1 to clarify the restriction of band n28 for CA\_n20-n28(R16)  5.5A.0  R4-2209342 Draft CR for 38.101-1 to add the missing simultaneous Rx/Tx capability for SUL band combinations (R16)  5.2C  R4-2210689 Draft CR for 38.101-1 to mainteinance NR V2X UE spec (R16)  5.3.5, 5.3E, 6.2E.1, 6.4E.1  R4-2211162 draft CR for TS 38.101-1: correction for DC location reporting (R16 cat-F)  6.4A.2.1, 6.4A.2.1.0, 6.4A.2.1.2, 6.4A.2.1.3, 6.4A.2.2.0  R4-2210687 Draft CR to 38.101-1 R16 adding the missing additional spurious emission requirement for CA\_NC\_NS\_04  R4-2209350 Draft CR for 38.101-1 to add exception clause for inter-band CA REFSENS (R16)  7.3A.2.3, 7.3A.2.4 R4-2210202 Correction to out-of-band blocking ranges  7.6.3, 7.6A.3.1  R4-2210209 Applicability of requirements for NS\_xxU  6.2.3.1, 6.5.2.3.3, 6.5.3.3.4, 6.5.3.3.5  R4-2210205 Configured maximum power in the absence of p-maxEUTRA and p-NR-FR1  6.2B.4.1.1, 6.2B.4.1.2, 6.2B.2.1.3, 6.2B.4.1.3a | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **X** |  | Test specifications | | | | TS 38.521-1 | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | R4-2211162 draft CR for TS 38.101-1: correction for DC location reporting (R16 cat-F)  This is a merged version of R4-2209380 and R4-2209752, also take into account of the comments during the discussion in RAN4#103e. The revised version also consider the case that 3300 and 3301 are not reported, the corresponding requirements should also be waived, which is described in the general sub-clauses. | | | | | | | | |

## ***<Start of change>***

## 5.2C Operating band combination for SUL

NR operation is designed to operate in the operating band combination defined in Table 5.2C-1 and Table 5.2C-2, where all operating bands are within FR1.

If the mandatory simultaneous Rx/Tx capability applies for a band combination, the mandatory simultaneous Rx/Tx capability also applies for the band combination when the applicable band combination is a subset of a higher order band combination.

Table 5.2C-1: Operating band combination for SUL in FR1

|  |  |
| --- | --- |
| NR Band combination for SUL | NR Band  (Table 5.2-1) |
| SUL\_n41-n802 | n41, n80 |
| SUL\_n41-n812 | n41, n81 |
| SUL\_n41-n952 | n41, n95 |
| SUL\_n77-n802 | n77, n80 |
| SUL\_n77-n842 | n77, n84 |
| SUL\_n78-n802 | n78, n80 |
| SUL\_n78-n812 | n78, n81 |
| SUL\_n78-n822 | n78, n82 |
| SUL\_n78-n832 | n78, n83 |
| SUL\_n78-n842 | n78, n84 |
| SUL\_n78-n862 | n78, n86 |
| SUL\_n79-n802 | n79, n80 |
| SUL\_n79-n812 | n79, n81 |
| SUL\_n79-n842 | n79, n84 |
| SUL\_n79-n952 | n79, n95 |
| NOTE 1: If a UE is configured with both NR UL and NR SUL carriers in a cell, the switching time between NR UL carrier and NR SUL carrier is 0 us.  NOTE 2: For UE supporting SUL band combination simultaneous Rx/Tx capability is mandatory.  NOTE 3: For UE supporting SUL band combination, UL MIMO is not configured on SUL carrier | |

Table 5.2C-2: Operating SUL band combination with intra-band non-contiguous CA in FR1

|  |  |
| --- | --- |
| NR Band combination for SUL | NR Band  (Table 5.2-1) |
| SUL\_n78(\*)-n862 | n78, n86 |
| NOTE 1: If a UE is configured with both NR UL and NR SUL carriers in a cell, the switching time between NR UL carrier and NR SUL carrier is 0 us.  NOTE 2: For UE supporting SUL band combination simultaneous Rx/Tx capability is mandatory.  NOTE 3: For UE supporting SUL band combination, UL MIMO is not configured on SUL carrier.  NOTE 4: The notation CA\_nX(\*) in this table indicates intra-band non-contiguous CA for band nX. The configurations for each band are in table 5.5C-2. | |

## ***<Next change>***

### 5.3.5 UE channel bandwidth per operating band

The requirements in this specification apply to the combination of channel bandwidths, SCS and operating bands shown in Table 5.3.5-1. The transmission bandwidth configuration in Table 5.3.2-1 shall be supported for each of the specified channel bandwidths. The channel bandwidths are specified for both the TX and RX path.

Table 5.3.5-1 Channel bandwidths for each NR band

| NR band / SCS / UE Channel bandwidth | | | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR 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 |
| n1 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
|  | 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
|  | 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| n2 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
|  | 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
|  | 60 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| n3 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
|  | 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
|  | 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n5 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
|  | 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n7 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
|  | 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
|  | 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| n8 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
|  | 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n12 | 15 | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  | Yes | Yes |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n14 | 15 | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  | Yes |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n18 | 15 | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  | Yes | Yes |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n20 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
|  | 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n25 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
|  | 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
|  | 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n26 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
|  | 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| n28 | 15 | Yes | Yes | Yes | Yes7 |  | Yes7 |  |  |  |  |  |  |  |
|  | 30 |  | Yes | Yes | Yes7 |  | Yes7 |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n29 | 15 | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  | Yes |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n30 | 15 | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  | Yes |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n34 | 15 | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  | Yes | Yes |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  | Yes | Yes |  |  |  |  |  |  |  |  |  |  |
| n3810 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
|  | 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
|  | 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n39 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
|  | 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
|  | 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n40 | 15 | Yes5 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
|  | 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  | Yes |  |  |
|  | 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  | Yes |  |  |
| n41 | 15 |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  |  |  |  |
|  | 30 |  | Yes | Yes | Yes |  | Yes | Yes | Yes | Yes |  | Yes | Yes | Yes |
|  | 60 |  | Yes | Yes | Yes |  | Yes | Yes | Yes | Yes |  | Yes | Yes | Yes |
| n46 | 15 |  | Yes5 |  | Yes |  |  | Yes |  |  |  |  |  |  |
|  | 30 |  | Yes5 |  | Yes |  |  | Yes |  | Yes |  | Yes |  |  |
|  | 60 |  | Yes5 |  | Yes |  |  | Yes |  | Yes |  | Yes |  |  |
| n4710 | 15 |  | Yes |  | Yes |  | Yes | Yes |  |  |  |  |  |  |
|  | 30 |  | Yes |  | Yes |  | Yes | Yes |  |  |  |  |  |  |
|  | 60 |  | Yes |  | Yes |  | Yes | Yes |  |  |  |  |  |  |
| n48 | 15 | Yes5 | Yes | Yes | Yes |  |  | Yes | Yes6 |  |  |  |  |  |
|  | 30 |  | Yes | Yes | Yes |  |  | Yes | Yes6 | Yes6 |  | Yes6 | Yes6,4 | Yes6 |
|  | 60 |  | Yes | Yes | Yes |  |  | Yes | Yes6 | Yes6 |  | Yes6 | Yes6,4 | Yes6 |
| n50 | 15 | Yes5 | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  |  |  |  |
|  | 30 |  | Yes | Yes | Yes |  | Yes | Yes | Yes | Yes |  | Yes3 |  |  |
|  | 60 |  | Yes | Yes | Yes |  | Yes | Yes | Yes | Yes |  | Yes3 |  |  |
| n51 | 15 | Yes |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n53 | 15 | Yes | Yes |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  | Yes |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  | Yes |  |  |  |  |  |  |  |  |  |  |  |
| n65 | 15 | Yes | Yes | Yes | Yes |  |  |  | Yes |  |  |  |  |  |
|  | 30 |  | Yes | Yes | Yes |  |  |  | Yes |  |  |  |  |  |
|  | 60 |  | Yes | Yes | Yes |  |  |  | Yes |  |  |  |  |  |
| n66 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
|  | 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
|  | 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n70 | 15 | Yes | Yes | Yes | Yes3 | Yes3 |  |  |  |  |  |  |  |  |
|  | 30 |  | Yes | Yes | Yes3 | Yes3 |  |  |  |  |  |  |  |  |
|  | 60 |  | Yes | Yes | Yes3 | Yes3 |  |  |  |  |  |  |  |  |
| n71 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
|  | 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n74 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
|  | 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
|  | 60 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| n75 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
|  | 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
|  | 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| n76 | 15 | Yes |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n77 | 15 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
|  | 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes4 | Yes | Yes4 | Yes |
|  | 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes4 | Yes | Yes4 | Yes |
| n78 | 15 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
|  | 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes4 | Yes | Yes | Yes |
|  | 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes4 | Yes | Yes | Yes |
| n79 | 15 |  |  |  |  |  |  | Yes | Yes |  |  |  |  |  |
|  | 30 |  |  |  |  |  |  | Yes | Yes | Yes |  | Yes |  | Yes |
|  | 60 |  |  |  |  |  |  | Yes | Yes | Yes |  | Yes |  | Yes |
| n80 | 15 | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |
|  | 30 |  | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |
|  | 60 |  | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |
| n81 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
|  | 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n82 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
|  | 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n83 | 15 | Yes | Yes | Yes | Yes7 |  |  |  |  |  |  |  |  |  |
|  | 30 |  | Yes | Yes | Yes7 |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n84 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
|  | 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
|  | 60 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| n86 | 15 | Yes | Yes | Yes | Yes |  |  | Yes |  |  |  |  |  |  |
|  | 30 |  | Yes | Yes | Yes |  |  | Yes |  |  |  |  |  |  |
|  | 60 |  | Yes | Yes | Yes |  |  | Yes |  |  |  |  |  |  |
| n89 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
|  | 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n90 | 15 |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  |  |  |  |
|  | 30 |  | Yes | Yes | Yes |  | Yes | Yes | Yes | Yes |  | Yes | Yes | Yes |
|  | 60 |  | Yes | Yes | Yes |  | Yes | Yes | Yes | Yes |  | Yes | Yes | Yes |
| n91 | 15 | Yes | Yes8 |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n92 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
|  | 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n93 | 15 | Yes | Yes8 |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n94 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
|  | 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n95 | 15 | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  | Yes | Yes |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  | Yes | Yes |  |  |  |  |  |  |  |  |  |  |
| n96 | 15 |  |  |  | Yes |  |  | Yes |  |  |  |  |  |  |
|  | 30 |  |  |  | Yes |  |  | Yes |  | Yes |  | Yes |  |  |
|  | 60 |  |  |  | Yes |  |  | Yes |  | Yes |  | Yes |  |  |
| NOTE 1: Void.  NOTE 2: Void.  NOTE 3: This UE channel bandwidth is applicable only to downlink.  NOTE 4: This UE channel bandwidth is optional in this release of the specification.  NOTE 5: For this bandwidth, the minimum requirements are restricted to operation when carrier is configured as an SCell part of DC or CA configuration.  NOTE 6: For this bandwidth, the minimum requirements are restricted to operation when carrier is configured as a downlink SCell part of CA configuration.  NOTE 7: For the 20 MHz bandwidth, the minimum requirements are specified for NR UL carrier frequencies confined to either 713-723 MHz or 728-738 MHz. For the 30MHz bandwidth, the minimum requirements are specified for NR UL transmission bandwidth configuration confined to either 703-733 or 718-748 MHz.  NOTE 8: This UE channel bandwidth is applicable only to uplink.  NOTE 9: Void.  NOTE 10: For this band, UE channel bandwidths which are applicable to sidelink operation are specified in Table 5.3E.1-1. | | | | | | | | | | | | | | |

## 5.3E Channel bandwidth for V2X

### 5.3E.1 General

NR V2X operation channel bandwidths for each operating band is specified in Table 5.3E.1-1. The same (symmetrical) channel bandwidth is specified for both the transmission and reception path.

Table 5.3E.1-1 NR V2X operation channel bandwidths for each operating band

| NR band / SCS / UE Channel bandwidth | | | | | |
| --- | --- | --- | --- | --- | --- |
| NR Band | SCS  kHz | 10 MHz | 20 MHz | 30 MHz | 40 MHz |
| n38 | 15 | Yes | Yes | Yes | Yes |
|  | 30 | Yes | Yes | Yes | Yes |
|  | 60 | Yes | Yes | Yes | Yes |
| n47 | 15 | Yes | Yes | Yes | Yes |
|  | 30 | Yes | Yes | Yes | Yes |
|  | 60 | Yes | Yes | Yes | Yes |

### 5.3E.2 Channel bandwidth for V2X concurrent operation

For NR V2X inter-band con-current operation in FR1, the NR V2X channel bandwidths for each operating band is specified in Table 5.3E.2-1.

Table 5.3E.2-1: Inter-band con-current operation configurations

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| V2X con-current operating band Configuration | NR Bands | SCS kHz | 5  MHz | 10 MHz | 15  MHz | 20 MHz | 30 MHz | 40 MHz | 50 MHz | Maximum bandwidth [MHz] | Bandwidth combination set |
| V2X\_n71A-n47A | n71 | 15 | Yes | Yes | Yes | Yes |  |  |  | 60 | 0 |
|  |  | 30 |  | Yes | Yes | Yes |  |  |  |  |  |
|  |  | 60 |  |  |  |  |  |  |  |  |  |
|  | n47 | 15 |  | Yes |  | Yes | Yes | Yes |  |  |  |
|  |  | 30 |  | Yes |  | Yes | Yes | Yes |  |  |  |
|  |  | 60 |  | Yes |  | Yes | Yes | Yes |  |  |  |

## ***<Next change>***

### 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.

For a CA configuration with one or more operating band supporting asymmetric channel bandwidths as specified in sub-clause 5.3.6, requirements are defined for an asymmetric UL and DL channel bandwidth combination of a supported asymmetric channel bandwidth combination set for an operating band of the CA configuration when the said UL and DL channel bandwidths are also contained in a supported bandwidth combination set of the CA configuration.

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

## ***<Next change>***

## 6.1 General

Unless otherwise stated, the transmitter characteristics are specified at the antenna connector of the UE with a single or multiple transmit antenna(s). For UE with integral antenna only, a reference antenna with a gain of 0 dBi is assumed.

Transmitter requirements for UL MIMO operation apply when the UE transmits on 2 ports on the same CDM group. The UE may use higher MPR values outside this limitation.

The applicability of transmitter requirements for Band n90 is in accordance with that for Band n41; a UE supporting Band n90 shall meet the minimum requirements for Band n41.

Unless otherwise stated, reference to power-class parameters in [7] also applies to extended versions with value(s) in accordance with the (extended) UE power class specified.

## 6.1A General

## ***<Next change>***

### 6.2.1 UE maximum output power

The following UE Power Classes define the maximum output power for any transmission bandwidth within the channel bandwidth of NR carrier unless otherwise stated. The period of measurement shall be at least one sub frame (1ms).

Table 6.2.1-1: UE Power Class

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR  band | Class 1 (dBm) | Tolerance (dB) | Class 1.5 (dBm) | Tolerance (dB) | Class 2 (dBm) | Tolerance (dB) | Class 3 (dBm) | Tolerance (dB) |
| n1 |  |  |  |  |  |  | 23 | ±2 |
| n2 |  |  |  |  |  |  | 23 | ±23 |
| n3 |  |  |  |  |  |  | 23 | ±23 |
| n5 |  |  |  |  |  |  | 23 | ±2 |
| n7 |  |  |  |  |  |  | 23 | ±23 |
| n8 |  |  |  |  |  |  | 23 | ±23 |
| n12 |  |  |  |  |  |  | 23 | ±23 |
| n14 | 316 | +2/-3 |  |  |  |  | 23 | ±2 |
| n18 |  |  |  |  |  |  | 23 | ±2 |
| n20 |  |  |  |  |  |  | 23 | ±23 |
| n25 |  |  |  |  |  |  | 23 | ±23 |
| n26 |  |  |  |  |  |  | 23 | ±23 |
| n28 |  |  |  |  |  |  | 23 | +2/-2.5 |
| n30 |  |  |  |  |  |  | 23 | ±2 |
| n34 |  |  |  |  |  |  | 23 | ±2 |
| n38 |  |  |  |  |  |  | 23 | ±2 |
| n39 |  |  |  |  |  |  | 23 | ±2 |
| n40 |  |  |  |  | 26 | +2/-3 | 23 | ±2 |
| n41 |  |  | 295 | +2/-33 | 26 | +2/-33 | 23 | ±23 |
| n47 |  |  |  |  |  |  | 23 | ±2 |
| n48 |  |  |  |  |  |  | 23 | +2/-3 |
| n50 |  |  |  |  |  |  | 23 | ±2 |
| n51 |  |  |  |  |  |  | 23 | ±2 |
| n53 |  |  |  |  |  |  | 23 | ±2 |
| n65 |  |  |  |  |  |  | 23 | ±2 |
| n66 |  |  |  |  |  |  | 23 | ±2 |
| n70 |  |  |  |  |  |  | 23 | ±2 |
| n71 |  |  |  |  |  |  | 23 | +2/-2.5 |
| n74 |  |  |  |  |  |  | 23 | ±2 |
| n77 |  |  |  |  | 26 | +2/-3 | 23 | +2/-3 |
| n78 |  |  |  |  | 26 | +2/-3 | 23 | +2/-3 |
| n79 |  |  |  |  | 26 | +2/-3 | 23 | +2/-3 |
| n80 |  |  |  |  |  |  | 23 | ±23 |
| n81 |  |  |  |  |  |  | 23 | ±2 |
| n82 |  |  |  |  |  |  | 23 | ±2 |
| n83 |  |  |  |  |  |  | 23 | +2/-2.5 |
| n84 |  |  |  |  |  |  | 23 | ±2 |
| n86 |  |  |  |  |  |  | 23 | ±2 |
| n89 |  |  |  |  |  |  | 23 | ±2 |
| n91 |  |  |  |  |  |  | 23 | ±23, 4 |
| n92 |  |  |  |  |  |  | 23 | ±23, 4 |
| n93 |  |  |  |  |  |  | 23 | ±23, 4 |
| n94 |  |  |  |  |  |  | 23 | ±23, 4 |
| n95 |  |  |  |  |  |  | 23 | ±2 |
| NOTE 1: PPowerClass is the maximum UE power specified without taking into account the tolerance  NOTE 2: Powerclass 3 is default power class unless otherwise stated  NOTE 3: Refers to the transmission bandwidths confined within FUL\_low and FUL\_low + 4 MHz or FUL\_high – 4 MHz and FUL\_high, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB.  NOTE 4: The maximum output power requirement is relaxed by reducing the lower tolerance limit by 0.3 dB  NOTE 5: Achieved via dual Tx  NOTE 6: Generally, PC1 UE for Band n14 is not targeted for smartphone form factor. The UE power class 1 requirements for Band n14 are applicable for public safety scenario only. | | | | | | | | |

For UE power class 1.5 the maximum output power for single-port transmission is defined as the sum of the maximum output power from both UE antenna connectors. For PUSCH tranmissions, a UEs supporting PC1.5 shall meet the maximum output power requirement when scheduled by DCI format 0\_0 or by DCI format 0\_1 configured for single antenna port.

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

- if the field of UE capability *maxUplinkDutyCycle-PC2-FR1* is absent and the percentage of uplink symbols transmitted in a certain evaluation period is larger than 50% (The exact evaluation period is no less than one radio frame); or

- if the field of UE capability *maxUplinkDutyCycle-PC2-FR1* is not absent and the percentage of uplink symbols transmitted in a certain evaluation period is larger than *maxUplinkDutyCycle-PC2-FR1* as defined in TS 38.331 (The exact evaluation period is no less than one radio frame); or

- if the IE P-Max as defined in TS 38.331 [7] is provided and set to the maximum output power of the default power class or lower;

- shall apply all requirements for the default power class to the supported power class and set the configured transmitted power as specified in clause 6.2.4;

- else if the UE does not support a power class with higher maximum output power than PC2; or

- if the field of UE capability *maxUplinkDutyCycle-PC2-FR1* is absent and the percentage of uplink symbols transmitted in a certain evaluation period is larger than 25% (The exact evaluation period is no less than one radio frame); or

- if the field of UE capability *maxUplinkDutyCycle-PC2-FR1* is not absent and the percentage of uplink symbols transmitted in a certain evaluation period is larger than 0.5\**maxUplinkDutyCycle-PC2-FR1*.(The exact evaluation period is no less than one radio frame); or  
if the IE P-Max as defined in TS 38.331 [7] is provided and set to the maximum output power of the power class 2 or lower;  
shall apply all requirements for power class 2 to the supported power class and set the configured transmitted power as specified in clause 6.2.4;

- else shall apply all requirements for the supported power class and set the configured transmitted power as specified in clause 6.2.4.

### 6.2.2 UE maximum output power reduction

## ***<Next change>***

#### 6.2.3.1 General

Additional emission requirements can be signalled by the network. Each additional emission requirement is associated with a unique network signalling (NS) value indicated in RRC signalling by an NR frequency band number of the applicable operating band and an associated value in the field *additionalSpectrumEmission.* Throughout this specification, the notion of indication or signalling of an NS value refers to the corresponding indication of an NR frequency band number of the applicable operating band, the IE field *freqBandIndicatorNR* and an associated value of *additionalSpectrumEmission* in the relevant RRC information elements [7]*.*

To meet the additional requirements, additional maximum power reduction (A-MPR) is allowed for the maximum output power as specified in Table 6.2.1-1. Unless stated otherwise, the total reduction to UE maximum output power is max(MPR, A-MPR) where MPR is defined in clause 6.2.2. Outer and inner allocation notation used in clause 6.2.3 is defined in clause 6.2.2. Unless stated otherwise, Edge RB allocations get the same AMPR as Outer RB allocations. In absence of modulation and waveform types the A-MPR applies to all modulation and waveform types.

Table 6.2.3.1-1 specifies the additional requirements with their associated network signalling values and the allowed A-MPR and applicable operating band(s) for each NS value. In case of a power class 3 UE, when IE *powerBoostPi2BPSK* is set to 1, power class 2 A-MPR values apply. The mapping of NR frequency band numbers and values of the *additionalSpectrumEmission* to network signalling labels is specified in Table 6.2.3.1-1A.

For almost contiguous allocations in CP-OFDM waveforms in power class 3, the allowed A-MPR defined in clause 6.2.3 is increased by CEIL{10 log10(1 + NRB\_gap / NRB\_alloc), 0.5} dB, where CEIL{x, 0.5} means x rounding upwards to closest 0.5dB, NRB\_gap is the total number of unallocated RBs between allocated RBs and NRB\_alloc is the total number of allocated RBs, and the parameter LCRB is replaced by NRB\_alloc + NRB\_gap in specifying the RB allocation regions.

Unless otherwise specified, pi/2 BPSK in following A-MPR tables refers to both variants of pi/2 BPSK referenced in 6.2.2 tables 6.2.2-1.

Table 6.2.3.1-1: Additional maximum power reduction (A-MPR)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Network signalling label | Requirements (clause) | NR Band | Channel bandwidth (MHz) | Resources blocks (*N*RB) | A-MPR (dB) |
| NS\_01 |  | Table 5.2-1  (NOTE 7) | 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | Table 5.3.2-1 | N/A |
| NS\_03 | 6.5.2.3.3 | n2, n25, n66,  n70, n86 |  |  | Clause 6.2.3.7 |
| NS\_03U | 6.5.2.3.3, 6.5.2.4.2 | n2, n25, n66, n86 (NOTE 1) |  |  | Clause 6.2.3.7 |
| NS\_04 | 6.5.2.3.2, 6.5.3.3.1 | n41 | 10, 15, 20, 30, 40, 50, 60 80, 90, 100 |  | Clause 6.2.3.2 |
| NS\_05 | 6.5.3.3.4 | n1, n65, n84 | 5, 10, 15, 20(NOTE 2) |  | Clause 6.2.3.4 |
| NS\_05U | 6.5.3.3.4, 6.5.2.4.2 | n1, n65, n84 (NOTE 1) | 5, 10, 15, 20 |  | Clause 6.2.3.4 |
| NS\_06 | 6.5.2.3.4 | n12 | 5, 10, 15 |  | N/A |
| n14 | 5,10 |
| NS\_10 |  | n20, n82 | 15, 20 | Table 6.2.3.3-1 | Table  6.2.3.3-1 |
| NS\_12 | 6.5.3.3.17 | n26 | 5,10 | Table 6.2.3.21-1 | Table 6.2.3.21-2 |
| NS\_13 | 6.5.3.3.18 | n26 | 5 | Table 6.2.3.22-1 | Table 6.2.3.22-2 |
| NS\_14 | 6.5.3.3.19 | n26 | 10,15,20 | Table 6.2.3.23-1 | Table 6.2.3.23-2 |
| NS\_15 | 6.5.3.3.20 | n26 | 5,10,15,20 | Table 6.2.3.24-1 | Table 6.2.3.24-2 |
| NS\_17 | 6.5.3.3.2 | n28, n83 | 5,10 | Table 5.3.2-1 | N/A |
| NS\_18 | 6.5.3.3.3 | n28, n83 | 5 |  | Table 6.2.3.13-1, A1 |
|  |  |  | 10, 15, 20 |  | Table 6.2.3.13-1, A2 |
|  |  |  | 30 |  | Table 6.2.3.13-1, A3, A4, A5 |
| NS\_21 | 6.5.3.3.12 | n30 | 5, 10 |  | Clause 6.2.3.14 |
| NS\_24 | 6.5.3.3.13 | n65 (NOTE 4) | 5, 10, 15, 20 | Table 6.2.3.15-1 | Clause 6.2.3.15 |
| NS\_27 | 6.5.2.3.8  6.5.3.3.14 | n48 | 5, 10, 15, 20, 40 | Table 6.2.3.16-1 | Table 6.2.3.16-2 |
| NS\_35 | 6.5.2.3.1 | n71 | 5, 10, 15, 20 | Table 5.3.2-1 | N/A |
| NS\_37 | 6.5.3.3.6 | n74  (NOTE 3) | 10, 15 | Table 6.2.3.8-1 | Table  6.2.3.8-1 |
| NS\_38 | 6.5.3.3.7 | n74 | 5, 10, 15, 20 | Table 6.2.3.9-1 | Table  6.2.3.9-1 |
| NS\_39 | 6.5.3.3.8 | n74 | 10, 15, 20 | Table 6.2.3.10-1 | Table 6.2.3.10-1 |
| NS\_40 | 6.5.3.3.9 | n51 | 5 |  | Table  6.2.3.5-1 |
| NS\_41 | 6.5.3.3.10 | n50 | 5, 10, 15, 20, 30, 40, 50, 60 |  | Table 6.2.3.11-1 |
| NS\_42 | 6.5.3.3.11 | n50 | 5, 10, 15, 20, 30, 40, 50, 60 |  | Table 6.2.3.12-1 |
| NS\_43 | 6.5.3.3.5 | n8, n81 | 5, 10, 15 |  | Clause 6.2.3.6 |
| NS\_43U | 6.5.3.3.5, 6.5.2.4.2 | n8, n81 (NOTE 1) | 5, 10, 15 |  | Clause 6.2.3.6 |
| NS\_44 | 6.5.3.3.24 | n38 | 25, 30, 40 | Table 6.2.3.20-1 | Table 6.2.3.20-1 |
| NS\_45 | 6.5.3.3.21 | n53 | 5, 10 |  | Clause 6.2.3.25 |
| NS\_46 | 6.5.3.3.25 | n7 | 25, 30, 40, 50 | Table 6.2.3.17-1 | Table 6.2.3.17-2 |
| NS\_47 | 6.5.3.3.15 | n41 (Note 5) | 30 | Table 6.2.3.18-1 | Table 6.2.3.18-2 |
| NS\_48 | 6.5.3.3.22 | n1 | 25, 30, 40, 50 | Table 6.2.3.26-1 | Table 6.2.3.26-1 |
| NS\_49 | 6.5.3.3.23 | n1 | 25, 30, 40, 50 | Table 6.2.3.27-1 | Table 6.2.3.27-1 |
| NS\_50 | 6.5.3.3.16 | n39 | 25, 30, 40 |  | Clause 6.2.3.19 |
| NS\_51 | 6.5.3.3.22 | n65 | 50 | Table 6.2.3.28-1 | Table 6.2.3.28-2 |
| NS\_55 | NOTE 6 | n77 | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 |  | N/A |
| NS\_100 | 6.5.2.4.2 | n1, n2, n3, n5, n8, n18, n25, n26, n65, n66, n80, n81, n84, n86, n89  (NOTE 1) |  |  | Table  6.2.3.1-2 |
| NOTE 1: This NS can be signalled for NR bands that have UTRA services deployed.  NOTE 2: No A-MPR is applied for 5 MHz BWChannel where the lower channel edge is ≥ 1930 MHz,10 MHz BWChannel where the lower channel edge is ≥ 1950 MHz and 15 MHz BWChannel where the lower channel edge is ≥ 1955 MHz.  NOTE 3: Applicable when the NR carrier is within 1447.9 – 1462.9 MHz.  NOTE 4: Applicable when the upper edge of the channel bandwidth frequency is greater than 1980 MHz.  NOTE 5: Applicable when the NR carrier is within 2545 – 2575 MHz.  NOTE 6: This NS value is applicable for cells in the range 3450 – 3550 MHz for operations in the USA. This NS value does not indicate any additional spurious emission and maximum output power reduction requirements.  NOTE 7: The NS\_01 label with the field *additionalPmax* [7] absent is default for all NR bands. | | | | | |

Table 6.2.3.1-1A: Mapping of network signalling label

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR band | Value of *additionalSpectrumEmission* | | | | | | | |
|  | **0** | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
| n1 | NS\_01 | NS\_100 | NS\_05 | NS\_05U | NS\_48 | NS\_49 |  |  |
| n2 | NS\_01 | NS\_100 | NS\_03 | NS\_03U |  |  |  |  |
| n3 | NS\_01 | NS\_100 |  |  |  |  |  |  |
| n5 | NS\_01 | NS\_100 |  |  |  |  |  |  |
| n7 | NS\_01 | NS\_46 |  |  |  |  |  |  |
| n8 | NS\_01 | NS\_100 | NS\_43 | NS\_43U |  |  |  |  |
| n12 | NS\_01 | NS\_06 |  |  |  |  |  |  |
| n14 | NS\_01 | NS\_06 |  |  |  |  |  |  |
| n18 | NS\_01 | NS\_100 |  |  |  |  |  |  |
| n20 | NS\_01 | Void | NS\_10 |  |  |  |  |  |
| n25 | NS\_01 | NS\_100 | NS\_03 | NS\_03U |  |  |  |  |
| n26 | NS\_01 | NS\_100 | NS\_12 | NS\_13 | NS\_14 | NS\_15 |  |  |
| n28 | NS\_01 | NS\_17 | NS\_18 |  |  |  |  |  |
| n30 | NS\_01 | NS\_21 |  |  |  |  |  |  |
| n34 | NS\_01 |  |  |  |  |  |  |  |
| n38 | NS\_01 | NS\_44 |  |  |  |  |  |  |
| n39 | NS\_01 | NS\_50 |  |  |  |  |  |  |
| n40 | NS\_01 |  |  |  |  |  |  |  |
| n41 | NS\_01 | NS\_04 | NS\_47 |  |  |  |  |  |
| n48 | NS\_01 | NS\_27 |  |  |  |  |  |  |
| n50 | NS\_01 | NS\_41 | NS\_42 |  |  |  |  |  |
| n51 | NS\_01 | NS\_40 |  |  |  |  |  |  |
| n53 | NS\_01 | NS\_45 |  |  |  |  |  |  |
| n65 | NS\_01 | NS\_24 | NS\_100 | NS\_05 | NS\_05U | NS\_51 |  |  |
| n66 | NS\_01 | NS\_100 | NS\_03 | NS\_03U |  |  |  |  |
| n70 | NS\_01 | NS\_03 |  |  |  |  |  |  |
| n71 | NS\_01 | NS\_35 |  |  |  |  |  |  |
| n74 | NS\_01 | NS\_37 | NS\_38 | NS\_39 |  |  |  |  |
| n77 | NS\_01 | NS\_55 |  |  |  |  |  |  |
| n78 | NS\_01 |  |  |  |  |  |  |  |
| n79 | NS\_01 |  |  |  |  |  |  |  |
| n80 | NS\_01 | NS\_100 |  |  |  |  |  |  |
| n81 | NS\_01 | NS\_100 | NS\_43 | NS\_43U |  |  |  |  |
| n82 | NS\_01 | Void | NS\_10 |  |  |  |  |  |
| n83 | NS\_01 | NS\_17 | NS\_18 |  |  |  |  |  |
| n84 | NS\_01 | NS\_100 | NS\_05 | NS\_05U |  |  |  |  |
| n86 | NS\_01 | NS\_100 | NS\_03 | NS\_03U |  |  |  |  |
| n89 | NS\_01 | NS\_100 |  |  |  |  |  |  |
| n91 | NS\_01 |  |  |  |  |  |  |  |
| n92 | NS\_01 |  |  |  |  |  |  |  |
| n93 | NS\_01 |  |  |  |  |  |  |  |
| n94 | NS\_01 |  |  |  |  |  |  |  |
| n95 | NS\_01 |  |  |  |  |  |  |  |
| NOTE: *additionalSpectrumEmission* corresponds to an information element of the same name defined in clause 6.3.2 of TS 38.331 [7]. | | | | | | | | |

Table 6.2.3.1-2: A-MPR for NS\_100 (UTRA protection)

|  |  |  |
| --- | --- | --- |
| Modulation/Waveform | | Outer (dB) |
| DFT-s-OFDM | Pi/2 BPSK | ≤ 2 |
|  | QPSK | ≤ 2 |
|  | 16 QAM | ≤ 2.5 |
|  | 64 QAM | ≤ 3 |
|  | 256 QAM | ≤ 4.5 |
| CP-OFDM | QPSK | ≤ 4 |
|  | 16 QAM | ≤ 4 |
|  | 64 QAM | ≤ 4 |
|  | 256 QAM | ≤ 6.5 |
| NOTE 1: Void  NOTE 2: Void | | |

##### 6.5.2.3.3 Requirements for network signalling values "NS\_03", “NS\_03U”, and "NS\_21"

Additional spectrum emission requirements are signalled by the network to indicate that the UE shall meet an additional requirement for a specific deployment scenario as part of the cell handover/broadcast message.

When "NS\_03", “NS\_03U”, or "NS\_21" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.2.3.3-1.

Table 6.5.2.3.3-1: Additional requirements for "NS\_03", “NS\_03U”, and "NS\_21"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ΔfOOB  MHz** | **Channel bandwidth (MHz) / Spectrum emission limit (dBm)** | | | | | | | **Measurement bandwidth** |
|  | **5** | **10** | **15** | **20** | **25** | **30** | **40** |  |
| ± 0-1 | -13 | -13 | -13 | -13 | -13 | -13 | -13 | 1 % of channel BW |
| ± 1-6 | -13 | -13 | -13 | -13 | -13 | -13 | -13 | 1 MHz |
| ± 6-10 | -25 | -13 | -13 | -13 | -13 | -13 | -13 | 1 MHz |
| ± 10-15 |  | -25 | -13 | -13 | -13 | -13 | -13 | 1 MHz |
| ± 15-20 |  |  | -25 | -13 | -13 | -13 | -13 | 1 MHz |
| ± 20-25 |  |  |  | -25 | -13 | -13 | -13 | 1 MHz |
| ± 25-30 |  |  |  |  | -25 | -13 | -13 | 1 MHz |
| ± 30-35 |  |  |  |  |  | -25 | -13 | 1 MHz |
| ± 35-40 |  |  |  |  |  |  | -13 | 1 MHz |
| ± 40-45 |  |  |  |  |  |  | -25 | 1 MHz |

NOTE: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

Table 6.5.2.3.3-2: Void

##### 6.5.3.3.4 Requirement for network signalling values "NS\_05" and “NS\_05U”

When "NS\_05" or “NS\_05U” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.3.4-1. This requirement also applies for the frequency ranges that are less than FOOB (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

Table 6.5.3.3.4-1: Additional requirements for "NS\_05" and “NS\_05U”

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency band  (MHz) | Channel bandwidth (MHz) / Spectrum emission limit (dBm) | Measurement bandwidth |  |
| 5, 10, 15, 20 |
| 1884.5 ≤ f ≤ 1915.7 | -41 | 300 kHz |  |

##### 6.5.3.3.5 Requirement for network signalling values "NS\_43" and “NS\_43U”

When "NS 43" or “NS\_43U” is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.3.5-1. This requirement also applies for the frequency ranges that are less than FOOB (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

Table 6.5.3.3.5-1: Additional requirements for "NS\_43" and “NS\_43U”

|  |  |  |
| --- | --- | --- |
| Frequency range  (MHz) | Channel bandwidth (MHz) / Spectrum emission limit (dBm) | Measurement bandwidth |
|  | 5, 10, 15 |  |
| 860 ≤ f ≤ 890 | -40 | 1 MHz |
| NOTE 1: Applicable for 5 MHz and 15 MHz channel BW confined between 900 MHz and 915 MHz and for 10 MHz channel BW confined between 905 MHz and 915 MHz | | |

## ***<Next change>***

#### 6.2.3.15 A-MPR for NS\_24

Table 6.2.3.15-1: A-MPR for NS\_24

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Channel Bandwidth, MHz | Carrier Centre Frequency, Fc, MHz | Region A | | | Region B | | | Region C | | |
|  |  | RBend\*12\*SCS  MHz | LCRB\*12\*SCS  MHz | A-MPR | RBend\*12\*SCS  MHz | LCRB\*12\*SCS  MHz | A-MPR | RBend\*12\*SCS  MHz | LCRB\*12\*SCS  MHz | A-MPR |
| 5MHz | Fc=1992.5 |  | >3.24 | A7 |  |  |  |  |  |  |
| 5MHz | Fc=1997.5 |  | >3.24 | A4 |  |  |  |  |  |  |
| 5MHz | Fc=2002.5 |  | >1.98 | A1 | >3.6 | >1.08 ≤1.98 | A2 | ≤3.6 | ≤1.98 | A3 |
|  |  |  |  |  |  | ≤1.08 | A6 |  |  |  |
| 10MHz | Fc=1985 | >5.4 |  | A4 |  |  |  |  |  |  |
| 10MHz | Fc=1995 |  | >4.32 | A1 | ≥7.20 | >1.08 ≤4.32 | A2 | <7.20 | ≤4.32 | A3 |
|  |  |  |  |  |  | ≤1.08 | A6 |  |  |  |
| 10MHz | Fc=2000 | ≥5.76 |  | A5 | <3.06 |  | A5 | ≥3.06  <5.76 | >1.44 | A6 |
| 15MHz | Fc=1987.5 |  | >6.84 | A1 | ≥10.8 | >1.08 ≤6.84 | A2 | <10.8 | ≤6.84 | A3 |
|  |  |  |  |  |  | ≤1.08 | A6 |  |  |  |
| 15MHz | Fc=1997.5 | ≥8.64 |  | A5 | <3.78 |  | A5 | ≥3.78  <8.64 | >1.44 | A6 |
| 20MHz | Fc=1990 | ≥12.96 |  | A5 | <4.68 |  | A5 | ≥4.68  <12.96 | >2.16 | A6 |
| 20MHz | Fc=1995 | ≥11.52 |  | A5 | <5.58 |  | A5 | ≥5.58  <11.52 | >1.44 | A6 |
| NOTE 1: The A-MPR values are listed in Table 6.2.3.15-2.  NOTE 2: For any undefined region, MPR applies | | | | | | | | | | |

Table 6.2.3.15-2: A-MPR for modulation and waveform type

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Modulation/Waveform | A1 | A2 | A3 | A4 | A5 | A6 | A7 |
|  | Outer/Inner | Outer/Inner | Outer/Inner | Outer | Outer/Inner | Outer/Inner | Outer |
| DFT-s-OFDM PI/2 BPSK | ≤ 11 | ≤ 5 | ≤ 4 | ≤ 8.5 | ≤ 18 | ≤ 10 | ≤ 3.5 |
| DFT-s-OFDM QPSK | ≤ 11 | ≤ 5 | ≤ 4 | ≤ 8.5 | ≤ 18 | ≤ 10 | ≤ 3.5 |
| DFT-s-OFDM 16 QAM | ≤ 11 | ≤ 5 | ≤ 4 | ≤ 8.5 | ≤ 18 | ≤ 10 | ≤ 3.5 |
| DFT-s-OFDM 64 QAM | ≤ 11 | ≤ 5 | ≤ 4 | ≤ 8.5 | ≤ 19 | ≤ 10 | ≤ 3.5 |
| DFT-s-OFDM 256 QAM | ≤ 11 | ≤ 5 |  | ≤ 8.5 | ≤ 20 | ≤ 10 |  |
| CP-OFDM QPSK | ≤ 13 | ≤ 6.5 | ≤ 4 | ≤ 8.5 | ≤ 19 | ≤ 12 | ≤ 5.5 |
| CP-OFDM 16 QAM | ≤ 13 | ≤ 6.5 | ≤ 4 | ≤ 8.5 | ≤ 19 | ≤ 12 | ≤ 5.5 |
| CP-OFDM 64 QAM | ≤ 13 | ≤ 6.5 | ≤ 4 | ≤ 8.5 | ≤ 19 | ≤ 12 | ≤ 5.5 |
| CP-OFDM 256 QAM | ≤ 13 | ≤ 6.5 |  | ≤ 8.5 | ≤ 20 | ≤ 12 |  |
| NOTE 1: The backoff applied is max(MPR, A-MPR) where MPR is defined in Table 6.2.2-1  NOTE 2: Outer and inner allocations are defined in clause 6.2.2 | | | | | | | |

## ***<Next change>***

#### 6.2.3.17 A-MPR for NS\_46

Table 6.2.3.17-1: A-MPR regions for NS\_46

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Channel Bandwidth, MHz | Carrier Center Frequency, Fc, MHz | Regions | | A-MPR |
|  |  | RBend\*12\*SCS  MHz | LCRB\*12\*SCS  MHz |  |
| 25 MHz | 2534.5 ≤ FC ≤ 2557.5 |  | Note 1 | A3 |
| 30 MHz | 2515 ≤ FC ≤ 2555 | ≥0, <1.44 | >0 | A4 |
|  |  | ≥1.44, <13.5 | >max (0, 12\*SCS\*RBend -1.8) | A5 |
|  |  | ≥13.5, <19.8 | >11.52 | A6 |
|  |  | ≥19.8, <25.92 | >6.3 | A7 |
|  |  | ≥25.92 | >0 | A8 |
| 40 MHz | 2520 ≤ FC ≤ 2550 | ≥0, <4.14 | >0 | A4 |
|  |  | ≥4.14, <18 | >max (0, 12\*SCS\*RBend - 4.5) | A5 |
|  |  | ≥18, <25.74 | >13.5 | A6 |
|  |  | ≥25.74, <32.4 | >12.6 | A7 |
|  |  | ≥32.4 | >0 | A8 |
| 50 MHz | 2525 ≤ FC ≤ 2545 | ≥0, <9 | >0 | A4 |
|  |  | ≥9, <21.6 | >max (0, 12\*SCS\*RBend - 7.2) | A5 |
|  |  | ≥21.6, <31.5 | >18 | A6 |
|  |  | ≥31.5, <39.6 | >16.2 | A7 |
|  |  | ≥39.6 | >0 | A8 |
| NOTE 1: > 9.72 MHz for DFT-s-OFDM, > 16.02 MHz for CP-OFDM. | | | | |

Table 6.2.3.17-2: A-MPR for NS\_46

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Modulation/Waveform | | A3 | A4 | A5 | A6 | A7 | A8 |
|  | | Outer | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner |
| DFT-s-OFDM | PI/2 BPSK | 4.5 | 5 | 2 | 3.5 | 6 | 10 |
|  | QPSK | 4.5 | 5 | 2 | 3.5 | 6 | 10 |
|  | 16 QAM | 4.5 | 5 | 2 | 3.5 | 6 | 10 |
|  | 64 QAM | 4.5 | 5 |  | 3.5 | 6 | 10 |
|  | 256 QAM |  |  |  |  | 6 | 10 |
| CP-OFDM | QPSK | 6 | 5 | 3.5 | 5.5 | 7 | 11 |
|  | 16 QAM | 6 | 5 | 3.5 | 5.5 | 7 | 11 |
|  | 64 QAM | 6 | 5 | 3.5 | 5.5 | 7 | 11 |
|  | 256 QAM | 6 |  |  |  | 7 | 11 |

## ***<Next change>***

#### 6.2A.3.1.2 UE additional maximum output power reduction for Intra-band non-contiguous CA

##### 6.2A.3.1.2.0 General

Table 6.2A.3.1.2-1 specifies the additional requirements with their associated network signalling values and the allowed A-MPR and applicable CA band(s) for each CA\_NC\_NS value. The mapping of NR CA band numbers and values of the *additionalSpectrumEmission* to network signalling labels is specified in Table 6.2A.3.1.2-2.

Table 6.2A.3.1.2-1: Additional Maximum Power Reduction (A-MPR) for intra-band non-contiguous CA

|  |  |  |  |
| --- | --- | --- | --- |
| CA Network Signalling value | Requirements (clause) | Uplink CA Configuration | A-MPR for sub-blocks in order of increasing uplink carrier frequency |
| A-MPR [dB]  (clause) |
| CA\_NC\_NS\_01 |  | All applicaple NR CA configurations | N/A |
| CA\_NC\_NS\_04 | 6.5A.2.3.2.1  6.5A.3.3.2.1 | CA\_n41(2A) | 6.2A.3.1.2.1 |

Table 6.2A.3.1.2-2: Mapping of network signaling label

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR CA band | Value of additionalSpectrumEmission | | | | | | | |
| **0** | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
| CA\_n41 | CA\_NC\_NS\_01 | CA\_NC\_NS\_04 |  |  |  |  |  |  |
| NOTE: *additionalSpectrumEmission* corresponds to an information element of the same name defined in clause 6.3.2 of TS 38.331 [7]. | | | | | | | | |

##### 6.2A.3.1.2.1 AMPR for CA\_NC\_NS\_04 (CA\_n41(2A))

For intra-band non-contiguous CA\_n41(2A) and it receives IE CA\_NC\_NS\_04, the UE determins the allowed Additional Maximum Power Reduction (AMPR) for the maximum output power as specified in this clause. The AMPR is specified into 2 types: AMPR to meet -25dBm/MHz and -13dBm/MHz. The A-MPR defined in this clause is used instead of MPR defined in 6.2A.2.2, not additively, so CA MPR=0 when CA\_NC\_NS\_04 is signaled.

The UE determins the AMPR type as follows:

If AND( MIN(FIM3,low\_block,high, SEM-13,low) < Ffilter,low , MAX( SEM-13,high, FIM3,high\_block,low ) > Ffilter,high )

A-MPRIM3 defined in Clause 6.2A.3.2.1.2

Else

A-MPRIM3 defined in Clause 6.2A.3.2.1.1

where

- LCRB1 is for CC1 which is the component carrier with lower frequency

- LCRB2 is for CC2 which is the component carrier with higher frequency

- B = (LCRB1\* 12\* SCS1 + LCRB2 \* 12 \* SCS2)/1,000,000

- FIM3,low\_block,high =(2 \* Flow\_alloc,high\_edge ) – Fhigh\_alloc,low\_edge

- FIM3,high\_block,low = (2 \* Fhigh\_alloc,low\_edge) – Flow\_alloc,high\_edge

- Flow\_alloc,low\_edge is the lowermost frequency of lower transmission bandwidth allocation.

- Flow\_alloc,high\_edge is the uppermost frequency of lower transmission bandwidth allocation.

- Fhigh\_alloc,low\_edge is the lowermost frequency of upper transmission bandwidth allocation.

- Fhigh\_alloc,high\_edge is the uppermost frequency of upper transmission bandwidth allocation.

- Ffilter,low = 2480 MHz

- Ffilter,high = 2745 MHz

- SEM-13,high = Threshold frequency where upper spectral emission mask for upper channel drops from -13 dBm / 1MHz to -25 dBm / 1MHz, as specified in Clause 6.5A.2.3.2.

- SEM-13,low = Threshold frequency where lower spectral emission mask below the lower channel drops from -13 dBm / MHz to -25 dBm / MHz, as specified in Clause 6.5A.2.3.2.

6.2A.3.1.2.1.1 AMPRIM3 to meet -25dBm/MHz

AMPR in this clause is for intra-band non-contiguous CA\_n41(2A) power class 3 for UEs indicating IE *dualPA-Architecture* supported. The allowed maximum output power reduction is defined as:

AMPRIM3=MAWhere MA is defined as follows

MA = 12; 0 ≤ B < 1.08

12; 1.08 ≤ B < 2.16

11; 2.16 ≤ B < 3.24

10; 3.24 ≤ B < 5.04

9; 5.04 ≤ B < 10.08

8; 10.08 ≤ B < 16.38

7; 16.38 ≤ B < 21.78

6; 21.78 ≤ B

6.2A.3.1.2.1.2 AMPRIM3 to meet -13dBm/MHz

AMPR in this clause is for intra-band non-contiguous CA\_n41(2A) power class 3 for UEs indicating IE *dualPA-Architecture* supported. The allowed maximum output power reduction is defined as:

AMPRIM3=MA

Where MA is defined as follows

MA = 9 ; 0 ≤ B < 0.54

8 ; 0.54 ≤ B < 1.08

7 ; 1.08 ≤ B < 2.16

6.5 ; 2.16 ≤ B < 3.24

5.5 ; 3.24 ≤ B < 5.4

4 ; 5.4 ≤ B

#### 6.2A.3.1.3 UE additional maximum output power reduction for Inter-band CA

## ***<Next change>***

### 6.2B.4 Configured output power for DC

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

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

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

For intra-band dual connectivity with one uplink serving cell per CG on E-UTRA and NR respectively, the UE is allowed to set its configured maximum output power PCMAX,*c(i),i* for serving cell *c(i)* of CG *i, i = 1,2*, and its total configured maximum transmission power for EN-DC operation = 10log10() with as specified in clause 7.6 of TS 38.213 [10].

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

PCMAX\_L\_E-UTRA,*c* (*p*) ≤ PCMAX\_E-UTRA,*c* (*p*) ≤ PCMAX H \_E-UTRA,*c* (*p*)

where PCMAX\_L\_E-UTRA,*c* andPCMAX H \_E-UTRA,*c* are the limits for a serving cell *c* as specified in TS 36.101 [4] clause 6.2.5 modified by PLTE as follows:

PCMAX\_L\_E-UTRA,*c* = MIN {MIN(PEMAX,*c*, PEMAX, EN-DC, PLTE) – tC\_ E-UTRA, *c*, (PPowerClass, EN-DC – ΔPPowerClass,EN-DC ), (PPowerClass,E-UTRA – ΔPPowerClass,E-UTRA) – MAX(MPR*c* + A-MPR*c* + ΔTIB,c + TC\_ E-UTRA, *c* + TProSe, P-MPR*c*)}

PCMAX H \_E-UTRA,*c* = MIN {PEMAX,*c*, PEMAX, EN-DC , PLTE, PPowerClass, EN-DC, PPowerClass,E-UTRA – ΔPPowerClass,E-UTRA}

where

- PEMAX,EN-DC is the value given by the field *p-maxUE-FR1* of the *RRCConnectionReconfiguration-v1530* IE as defined in TS 36.331 [8];

- PLTE is the value given by the field *p-maxEUTRA-r15* of the *RRCConnectionReconfiguration-v1510* IE as defined in TS 36.331 [8] which is the same as PLTE in TS 38.213 [10]; if *p-maxEUTRA-r15* is not indicated, the value of PLTE is evaluated as infinity in the configured output power calculation;

- ∆tC\_EUTRA, c = 1.5 dB when NOTE 2 in Table 6.2.2-1 of TS 36.101 [4] applies; ∆tC\_EUTRA, c = 0 dB otherwise;

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

- for a UE indicating support of dynamicPowerSharing, the MPRc and the A-MPR*c* are determined in accordance with the DCI of serving cell *c* of the CG 1 and the specification in clause 6.2.4 of TS 36.101 [4];

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

and whenever NS\_01 is indicated in CG 1:

- for a UE indicating support of dynamicPowerSharing, the MPR*c* is determined in accordance with the DCI of serving cell *c* of the CG 1 and the specification in clause 6.2.4 of TS 36.101 [4];

- for a UE not indicating support of dynamicPowerSharing, the MPR*c* is determined in accordance with clause 6.2B.2.1 with parameters applicable for UEs not indicating support of dynamicPowerSharing and A-MPR*c* = 0 dB;

The configured maximum output power PCMAX,f,*c,NR* (*q*) in physical channel *q* for the configured NR carrier shall be set within the bounds:

PCMAX\_L,f,*c,,NR* (*q*) ≤ PCMAX,f,*c,NR* (*q*) ≤ PCMAX\_H,f,*c,NR* (*q*)

where PCMAX\_L,f,*c,NR* andPCMAX\_H,f,*c,NR* are the limits for a serving cell c as specified in clause 6.2.4 of TS 38.101-1 [2] modified as follows:

PCMAX\_L,f,*c,,NR* = MIN {MIN(PEMAX,c , PEMAX, EN-DC, PNR) - TC\_NR, *c*, (PPowerClass, EN-DC – ΔPPowerClass,EN-DC ), (PPowerClass,NR – ΔPPowerClass,NR) – MAX(MAX(MPRc,A-MPRc)+ ΔTIB,c + TC\_NR, *c* + ∆TRxSRS, P-MPRc) }

PCMAX\_H,f,*c,NR* = MIN {PEMAX,c, PEMAX, EN-DC, PNR, PPowerClass, EN-DC, PPowerClass,NR – ΔPPowerClass,NR }

where

- PEMAX,EN-DC is the value given by the field *p-maxUE-FR1* of the *RRCConnectionReconfiguration-v1530* IE as defined in TS 36.331 [8];

- PLTE signalled by RRC as *p-MaxEUTRA-r15* in TS 36.331 [8]; if *p-maxEUTRA-r15* is not indicated, the value of PLTE is evaluated as infinity in the configured output power calculation;

- PNR is the value given by the field *p-NR-FR1* of the *PhysicalCellGroupConfig* IE as defined in [9] and signalled by RRC; if *p-NR-FR1* is not indicated, the value of PNR is evaluated as infinity in the configured output power calculation;

- ΔTc\_E-UTRA, *c* = 1.5dB when NOTE 2 in Table 6.2.2-1 in TS 36.101 [4] applies for a serving cell *c*, otherwise TC\_ E-UTRA,*c* = 0dB;

- TC\_NR,*c* = 1.5dB when NOTE 3 in Table 6.2.1-1 in TS 38.101-1 [2] applies for a serving cell *c*, otherwise TC\_NR,*c* = 0dB;

- ΔTIB,c specified in clause 6.2B.4.2.1 for EN-DC, the individual Power Class defined in table 6.2B.1.1 and any other additional power reductions parameters specified in clauses 6.2B.2 and 6.2B.3 for EN-DC are applicable to PCMAX\_E-UTRA,*c* and PCMAX,f,*c,NR* evaluations.

- PPowerClass, EN-DC is defined in clause 6.2B.1.1 for intra-band contiguous EN-DC;

- PPowerClass,NR is the nominal UE power of the power class that the UE supports for the NR band of the EN-DC combination as defined in clause 6.2.1 of 38.101-1 [2]; in case IE [*powerClassNRPart*] as defined in TS 38.331 [9] is indicated, PPowerClass,NR should use that value instead;

- ΔPPowerClass,NR is 3 dB, 6 dB, or 0 dB according to clause 6.2.4 of TS 38.101-1 [2] for a UE that supports power class 2 or power class 1.5 in the NR band of the EN-DC combination as defined in clause 6.2.1 of TS 38.101-1 [2];

- PPowerClass,E-UTRA is the nominal UE power of the power class that the UE supports for the E-UTRA band of the EN-DC combination as defined in clause 6.2.2 of 36.101 [4];

- ΔPPowerClass,E-UTRA is 3 dB or 0 dB according to clause 6.2.5 of TS 36.101 [4] for a UE that supports power class 2 in the E-UTRA band of the EN-DC combination as defined in clause 6.2.2 of TS 36.101 [4];

- ΔPPowerClass,EN-DC is 3 dB for a power class 2 capable EN-DC UE when LTE UL/DL configuration is 0 or 6; or LTE UL/DL configuration is 1 and special subframe configuration is 0 or 5; ΔPPowerClass,EN-DC = 3 dB when the IE *p-maxUE-FR1* as defined in TS 36.331 [4] is provided and set to the maximum output power of the default power class or lower; ΔPPowerClass,EN-DC is 6 dB for a power class 1.5 capable EN-DC UE when the LTE UL duty cycle is greater than max(50%, *maxUplinkDutyCycle-PC2-FR1*); ΔPPowerClass,EN-DC is 3 dB for a power class 1.5 capable EN-DC UE when the LTE UL duty cycle is between max(50%, *maxUplinkDutyCycle-PC2-FR1*) and max(25%,0.5\**maxUplinkDutyCycle-PC2-FR1*); otherwise ΔPPowerClass,EN-DC = 0 dB; The IE *maxUplinkDutyCycle-PC2-FR1* is defined in TS 38.331 [9].

and whenever an NS signalling other than NS\_01 is indicated within CG 2:

- for a UE indicating support of dynamicPowerSharing, A-MPR*c* = A-MPR'*c* with A-MPR'*c* determined in accordance with clause 6.2B.3.1 and MPR*c* = 0 dB if transmission(s) in subframe *p* on CG 1 overlap in time with physical channel *q* on CG 2;

- for a UE indicating support of dynamicPowerSharing, A-MPR*c* is determined in accordance with TS 38.101-1 [2] if transmission(s) in subframe *p* on CG 1 does not overlap in time with physical channel *q* on CG 2;

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

and whenever NS\_01 is indicated in CG 2.

- for a UE indicating support of dynamicPowerSharing, MPRc = MPR'c with MPR'c determined in accordance with clause 6.2B.2.1 and A-MPRc = 0 dB if transmission(s) in subframe p on CG 1 overlap in time with physical channel q on CG 2;

- for a UE indicating support of dynamicPowerSharing, MPRc is determined in accordance with TS 38.101-1 [2] if transmission(s) in subframe p on CG 1 does not overlap in time with physical channel q on CG 2;

- for a UE not indicating support of dynamicPowerSharing, the MPRc is determined in accordance with clause 6.2B.2.1 with parameters applicable for UEs not indicating support of dynamicPowerSharing and A-MPRc = 0 dB;

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

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

If the UE does not support dynamic power sharing,

= MIN { PEMAX, EN-DC , PPowerClass, EN-DC - ΔPPowerClass,EN-DC } + 0.3 dB

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

PEN-DC,tot\_L ≤ ≤ PEN-DC,tot\_H

where

PEN-DC,tot\_L (*p,q*) = MIN{ PPowerClass,EN-DC - ΔPPowerClass,EN-DC – MAX{MPRtot, A-MPRtot}, PEMAX,EN-DC}

PEN-DC,tot\_H (*p,q*) = MIN{PPowerClass,EN-DC, PEMAX,EN-DC }

for sub-frame *p* on CG 1 overlapping with physical channel *q* on CG 2 and with MPRtot and A-MPRtot in accordance with 6.2B.2.1 and clause 6.2B.3.1, respectively.

The measured total maximum output power PUMAX over both CGs/RATs, measured over the transmission reference time duration is

PUMAX = 10 log10 [pUMAX,*c,E-UTRA* + pUMAX,*f,c,NR*],

where pUMAX,*c,E-UTRA* and pUMAX,*c,NR* denotes the measured output power of serving cell *c for E-UTRA and NR* respectively, expressed in linear scale.

For UEs indicating support of dynamicPowerSharing, the measured total configured maximum output power PUMAX shall be within the following bounds:

PCMAX\_L -TLOW (PCMAX\_L) ≤ PUMAX  ≤ PCMAX\_H + THIGH (PCMAX\_H)

with the tolerances TLOW(PCMAX\_L) and THIGH(PCMAX\_H) for applicable values of PCMAX\_L and PCMAX\_L specified in Table 6.2B.4.1.1-2.

When an UL subframe transmission *p* from E-UTRA overlap with a physical channel *q* from the NR*,* then for PUMAX evaluation, the E-UTRA subframe *p* is takenas reference period TREF and always considered as the reference measurement duration and the following rules are applicable.

TREF and Teval are specified in Table 6.2B.4.1.1-1 when same or different subframes and physical channel durations are used in aggregated carriers. The lesser of PPowerClass ,EN-DC and PEMAX,EN-DC shall not be exceeded by the UE during any evaluation period of time.

Table 6.2B.4.1.1-1: PCMAX evaluation window

|  |  |  |
| --- | --- | --- |
| transmission duration | TREF | Teval |
| Different transmission duration in different RAT carriers | E-UTRA Subframe | Min(*Tno\_hopping*, Physical Channel Length) |

For each TREF, the PCMAX\_H is evaluated per Teval and given by the maximum value over the transmission(s) within the Teval as follows:

PCMAX\_H = MAX { PCMAX\_ EN-DC \_H (*p,q*) , PCMAX\_ EN-DC \_H (*p,q+1*), … , PCMAX\_ EN-DC \_H (*p,q+n*) }

where PCMAX\_ EN-DC \_H are the applicable upper limits for each overlapping scheduling unit pairs *(p,q*) , (*p, q+1*) , up to *(p, q+n*) for each applicable Teval duration, where q+*n* is the last NR UL physical channel overlapping with E-UTRA subframe p.

While PCMAX\_L is computed as follows:

PCMAX\_L = MIN { PCMAX\_ EN-DC \_L (*p,q*) , PCMAX\_ EN-DC \_L (*p,q+1*), … , PCMAX\_ EN-DC \_L (*p,q+n*)}

where PCMAX\_EN-DC\_L are the applicable lower limits for each overlapping scheduling unit pairs *(p,q*) , (*p, q+1*) , up to *(p, q+n*) for each applicable Teval duration, where q+*n* is the last NR UL physical channel overlapping with E-UTRA subframe p,

With

PCMAX\_ EN-DC \_H(*p,q*) = MIN {10 log10 [pCMAX H \_E-UTRA,*c* (*p*) + pCMAX H,f,*c,NR* (*q*)], PEMAX, EN-DC ,PPowerClass, EN-DC}

And:

a= 10 log10 [pCMAX\_E-UTRA,*c* (*p*) +pCMAX,f,*c,NR* (*q*) ] > PEN-DC,tot\_L

b= 10 log10 [pCMAX\_E-UTRA,*c* (*p*) +pCMAX,f,*c,NR* (*q*) /X\_scale] > PEN-DC,tot\_L

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

PCMAX\_ EN-DC \_L(*p,q*) = MIN {10 log10 [pCMAX L \_E-UTRA,*c* (*p*) + pCMAX L,f,*c,,NR* (*q*)], PEMAX, EN-DC ,PPowerClass, EN-DC - ΔPPowerClass,EN-DC }

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

PCMAX\_ EN-DC \_L(*p,q*) = MIN {10 log10 [pCMAX L \_E-UTRA,*c* (*p*) + pCMAX L,f,*c,,NR* (*q*) /X\_scale ], PEMAX, EN-DC ,PPowerClass, EN-DC - ΔPPowerClass,EN-DC }

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

PCMAX\_ EN-DC \_L(*p,q*) = MIN {10 log10 [pCMAX L \_E-UTRA,*c* (*p*) ], PEMAX, EN-DC ,PPowerClass, EN-DC- ΔPPowerClass,EN-DC }

where

- pCMAX H \_E-UTRA,*c* (*p*) is the E-UTRA higher limit of the maximum configured power expressed in linear scale;

- pCMAX H,f,*c,NR* (*q*) is the NR higher limit of the maximum configured power expressed in linear scale;

- pCMAX L \_E-UTRA,*c* (*p*) is the E-UTRA lower limit of the maximum configured power expressed in linear scale;

- pCMAX L,f,*c,NR* (*q*) is the NR lower limit of the maximum configured power expressed in linear scale;

- PPowerClass, EN-DC is defined in clause 6.2B.1.1 for intra-band EN-DC;

- X\_scale is the linear value of X dB which is configured by RRC and can only take values [0 , 6] dB

- pCMAX E-UTRA,c (*p*) is the linear value of PCMAX E-UTRA,c (*p*), the real configured max power for E-UTRA

- pCMAX,f,c *NR*(*q*) is the linear value of PCMAX,f,c,*NR*(*q*), the real configured max power of NR

Table 6.2B.4.1.1-2: PCMAX tolerance for Dual Connectivity E-UTRA-NR

|  |  |  |
| --- | --- | --- |
| PCMAX(dBm) | Tolerance  TLOW (PCMAX\_L) (dB) | Tolerance  THIGH (PCMAX\_H) (dB) |
| 23 ≤ PCMAX ≤ 33 | 3.0 | 2.0 |
| 22 ≤ PCMAX < 23 | 5.0 | 2.0 |
| 21 ≤ PCMAX< 22 | 5.0 | 3.0 |
| 20 ≤ PCMAX < 21 | 6.0 | 4.0 |
| 16 ≤ PCMAX < 20 | 5.0 | |
| 11 ≤ PCMAX < 16 | 6.0 | |
| -40 ≤ PCMAX < 11 | 7.0 | |

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

10log(pCMAX L,f,*c,NR*(*q*)/X\_scale) – TLOW (10log(pCMAX L,f,*c,NR*(*q*)/X\_scale) )} ≤ PUMAX,f,*c,NR* (*q*) ≤ 10log(pCMAX H, f,*c,NR* (*q*)) + THIGH (10log(pCMAX H, f,*c,NR* (*q*))).

with the tolerances TLOW and THIGH for applicable values of PCMAX specified in Table 6.2B.4.1.1-2.

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

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

PUMAX,f,*c,NR* (*q*) ≤ 10log(pCMAX H, f,*c,NR* (*q*)) + THIGH (10log(pCMAX H, f,*c,NR* (*q*))).

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

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

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

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

whenever NS\_01 is not indicated within CG 1 while

- for a UE not indicating support of dynamicPowerSharing, the MPR*c* determined in accordance with clause 6.2B.2.2 with parameters applicable for UEs not indicating support of dynamicPowerSharing and A-MPR*c* = 0 dB;

whenever NS\_01 is indicated in CG 1.

The configured maximum output power PCMAX,f,*c,NR* (*q*) in physical channel *q* for the configured NR carrier shall be set in accordance with clause 6.2B.4.1.1 but where

- for a UE indicating support of dynamicPowerSharing, A-MPR*c* = A-MPR'*c* with A-MPR'*c* determined in accordance with clause 6.2B.3.2 and MPR*c* = 0 dB if transmission(s) in subframe *p* on CG 1 overlap in time with physical channel *q* on CG 2;

- for a UE indicating support of dynamicPowerSharing, A-MPR*c* is determined in accordance with TS 38.101-1 [2] if transmission(s) in subframe *p* on CG 1 does not overlap in time with physical channel *q* on CG 2;

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

whenever NS\_01 is not indicated in CG 2 while

- for a UE indicating support of dynamicPowerSharing, MPR*c* = MPR'*c* with MPR'*c* determined in accordance with clause 6.2B.2.2 and A-MPR*c* = 0 dB if transmission(s) in subframe *p* on CG 1 overlap in time with physical channel *q* on CG 2;

- for a UE indicating support of dynamicPowerSharing, MPR*c* is determined in accordance with TS 38.101-1 [2] if transmission(s) in subframe *p* on CG 1 does not overlap in time with physical channel *q* on CG 2;

- for a UE not indicating support of dynamicPowerSharing, the MPR*c* is determined in accordance with clause 6.2B.2.2 with parameters applicable for UEs not indicating support of dynamicPowerSharing and A-MPR*c* = 0 dB;

whenever NS\_01 is indicated in CG 2.

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

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

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

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

For inter-band dual connectivity with one uplink serving cell or more than one uplink serving cells configured for intra-band UL CA on the E-UTRA CG and one uplink serving cell on the NR CG or more than one uplink serving cells configured for intra-band UL CA, the UE is allowed to set its configured maximum output power PCMAX,*c(i),i* for serving cell *c(i)* of CG *i, i = 1,2*, and its total configured maximum transmission power for EN-DC operation, = 10log10() with as specified in clause 7.6 of TS 38.213 [10]. For EN-DC with more than one uplink serving cells configured for intra-band UL CA on the E-UTRA CG, the PCMAXapplies to the entire E-UTRA CG. For EN-DC with more than one uplink serving cells configured for intra-band UL CA on the NR CG, the PCMAXapplies to the entire NR CG.

For a UE configured with EN-DC and serving cell frame structure type 1, if the UE is configured with *subframeAssignment-r15* for the serving cell and E-UTRA Pcell is FDD, the UE is not expected to be configured with more than one serving cells in the uplink.

The configured maximum output power PCMAX\_E-UTRA,*c* (*p*) in sub-frame *p* for the configured E-UTRA uplink carrier(s) shall be set within the bounds:

PCMAX\_L\_E-UTRA,*c* (*p*) ≤ PCMAX\_E-UTRA,*c* (*p*) ≤ PCMAX H \_E-UTRA,*c* (*p*)

where PCMAX\_L\_E-UTRA,*c* andPCMAX H \_E-UTRA,*c* are the limits for a serving cell *c* as specified in TS 36.101 [4] clause 6.2.5 modified by PLTE as follows:

PCMAX\_L\_E-UTRA,*c* = MIN { PEMAX, EN-DC , (PPowerClass, EN-DC – ΔPPowerClass,EN-DC ), MIN(PEMAX,*c*, PLTE) – tC\_ E-UTRA, *c*, (PPowerClass,E-UTRA – ΔPPowerClass,E-UTRA) – MAX(MPR*c* + A-MPR*c* + ΔTIB,c + tC\_ E-UTRA, *c* + TProSe, P-MPR*c*)}

PCMAX H \_E-UTRA,*c* = MIN {PEMAX,*c*, PEMAX, EN-DC , (PPowerClass, EN-DC – ΔPPowerClass,EN-DC ), PLTE, PPowerClass,E-UTRA – ΔPPowerClass,E-UTRA}

For EN-DC with more than one uplink serving cells configured for intra-band UL CA on the E-UTRA CG, PCMAX\_L\_E-UTRA,*c* andPCMAX H \_E-UTRA,*c* are the limits for the E-UTRA CG as specified in TS 36.101 [4] clause 6.2.5A modified by PLTE as follows:

PCMAX\_L\_E-UTRA,*c* = MIN{10 log10 ∑ pEMAX,c  - TC , (PPowerClass,E-UTRA – ΔPPowerClass,E-UTRA) – MAX(MPR + A-MPR + ΔTIB,c + TC + TProSe, P-MPR), PLTE, PPowerClass,EN-DC }

PCMAX H \_E-UTRA,*c* = MIN{10 log10 ∑ pEMAX,c , PPowerClass,E-UTRA, PLTE, PPowerClass,EN-DC}

The configured maximum output power PCMAX,f,*c,NR* (*q*) in physical-channel *q* for the configured NR carrier shall be set within the bounds:

PCMAX\_L,f,*c,NR* (*q*) ≤ PCMAX,f,*c,NR* (*q*) ≤ PCMAX\_H,f,*c,NR* (*q*)

where PCMAX\_L,f,*c,NR* andPCMAX\_H,f,*c,NR* are the limits for a serving cell c as specified in clause 6.2.4 of TS 38.101-1 [2] modified as follows:

PCMAX\_L,f,*c,NR* = MIN { PEMAX, EN-DC , (PPowerClass, EN-DC – ΔPPowerClass,EN-DC ), MIN(PEMAX,c , PNR ) - TC\_NR, *c*, (PPowerClass,NR – ΔPPowerClass,NR) – MAX(MAX(MPRc, A-MPRc)+ ΔTIB,c + TC\_NR, *c* + ∆TRxSRS, P-MPRc) }

PCMAX\_H,f,*c,NR* = MIN {PEMAX,c, PEMAX, EN-DC , (PPowerClass, EN-DC – ΔPPowerClass,EN-DC ), PNR , PPowerClass,NR – ΔPPowerClass,NR }

For EN-DC with more than one uplink serving cells configured for intra-band UL CA on the NR CG, PCMAX\_L,f,c,NR andPCMAX\_H,f,c,NRare the limits for the NR CG as specified in [2] subclause 6.2A.4 modified by PNR as follows:

PCMAX\_L,f,*c,NR* = MIN{10 log10 ∑ pEMAX,c  - TC , PEMAX,CA, PPowerClass,NR – MAX(MPR + A-MPR + ΔTIB,c + T\_NR ,C + TRxSRS, P-MPR), PNR, PPowerClass,EN-DC }

PCMAX\_H,f,*c,NR* = MIN{10 log10 ∑ pEMAX,c , PEMAX,CA, PPowerClass,NR, PNR, PPowerClass,EN-DC}

where

- PEMAX,EN-DC is the value given by the field *p-maxUE-FR1* of the *RRCConnectionReconfiguration-v1530* IE as defined in TS 36.331 [8];

- If more than one E-UTRA uplink serving cell is configured as intra-band UL CA in the E-UTRA CG, PPowerClass refers to the maximum output power of the E-UTRA intra-band CA power class given in Table 6.2.2A-1 of TS 36.101 [4],

- If more than one NR uplink serving cell is configured as intra-band UL CA in the NR CG, PPowerClass refers to the maximum output power of the NR intra-band CA power class given in sub clause 6.2A.1 of [2],

- PLTE is the value given by the field *p-maxEUTRA-r15* of the *RRCConnectionReconfiguration-v1510* IE as defined in TS 36.331 [8]; if *p-maxEUTRA-r15* is not indicated, the value of PLTE is evaluated as infinity in the configured output power calculation;

- If more than one E-UTRA uplink serving cell is configured as intra-band UL CA in the E-UTRA CG, MPR*c* = MPR and A-MPR*c* = A-MPR with MPR and A-MPR specified in clause 6.2.3A and clause 6.2.4A of TS 36.101 [4] respectively. There is one power management term for the UE, denoted P-MPR, and P-MPR*c* = P-MPR. PCMAX\_E-UTRA,*c* is calculated under the assumption that the transmit power is increased by the same amount in dB on all component carriers within the E-UTRA CG.

- If more than one NR uplink serving cell is configured as intra-band UL CA in the NR CG, MPR*c* and A-MPR*c* are determined by subclause 6.2.2 of [2]. There is one power management term for the UE, denoted P-MPR, and P-MPR*c* = P-MPR.

- PNR is the value given by the field *p-NR-FR1* of the *PhysicalCellGroupConfig* IE as defined in TS 38.331 [9]; if *p-NR-FR1* is not indicated, the value of PNR is evaluated as infinity in the configured output power calculation;

- Δtc\_E-UTRA, *c* = 1.5 dB when NOTE 2 in Table 6.2.2-1 in TS 36.101 [4] applies for a serving cell *c*, otherwise TC\_ E-UTRA,*c* = 0 dB;

- TC\_NR,*c* = 1.5dB when NOTE 3 in Table 6.2.1-1 in TS 38.101-1 [2] applies for a serving cell *c*, otherwise TC\_NR,*c* = 0 dB;TC\_NR,C is the highest value TC\_NR,C among all serving cells *c* if more than one NR uplink serving cell is configured as intra-band UL CA in the NR CG;

- PPowerClass, EN-DC is defined in clause 6.2B.1.3 for inter-band EN-DC;

- ∆PPowerClass,EN-DC = 3 dB for a power class 2 capable EN-DC UE when requirements of default power class had been applied as specified in sub-clause 6.2B.1; otherwise ∆PPowerClass,EN-DC = 0 dB;

- PPowerClass,NR is the nominal UE power of the power class that the UE supports for the NR band of the EN-DC combination as defined in clause 6.2.1 of 38.101-1 [2]; in case IE [*powerClassNRPart*] as defined in TS 38.331 [9] is indicated, PPowerClass,NR should use that value instead;

- ΔPPowerClass,NR is 3 dB or 0 dB according to clause 6.2.4 of TS 38.101-1 [2] for a UE that supports power class 2 in the NR band of the EN-DC combination as defined in clause 6.2.1 of TS 38.101-1 [2];

- PPowerClass,E-UTRA is the nominal UE power of the power class that the UE supports for the E-UTRA band of the EN-DC combination as defined in clause 6.2.2 of 36.101 [4];

- ΔPPowerClass,E-UTRA is 3 dB or 0 dB according to clause 6.2.5 of TS 36.101 [4] for a UE that supports power class 2 in the E-UTRA band of the EN-DC combination as defined in clause 6.2.2 of TS 36.101 [4];

- ΔTIB,c specified in clause 6.2B.4.2.3 for EN-DC, the individual Power Class defined in table 6.2B.1.3 and any other additional power reductions parameters specified in clauses 6.2B.2 and 6.2B.3for EN-DC are applicable to PCMAX\_E-UTRA,*c* and PCMAX,f,*c,NR* evaluations.

- ∆TRxSRS is the highest value among all serving cells *c.*

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

= 10log10() with the configured maximum transmission power for EN-DC operation as specified in clause 7.6 of TS 38.213 [10].

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

= MIN { PEMAX, EN-DC ,PPowerClass, EN-DC – ΔPPowerClass, EN-DC }

If the UE does not support dynamic power sharing,

= MIN { PEMAX, EN-DC ,PPowerClass, EN-DC – ΔPPowerClass, EN-DC } + 0.3 dB

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

When a UE supporting dynamic sharing is configured for overlapping E-UTRA uplink and NR uplink transmissions, the UE can set its configured maximum output power PCMAX\_E-UTRA,*c* and PCMAX,f,*c,NR* for the configured E-UTRA and NR uplink carriers, respectively, and its configured maximum transmission power for EN-DC operation, , as specified above.

The measured total maximum output power PUMAX over both CGs/RATs, measured over the transmission reference time duration is

PUMAX = 10 log10 [pUMAX,*c,E-UTRA* + pUMAX,*c,NR*],

where pUMAX,*c,E-UTRA* and pUMAX,*c,NR* denotes the measured output power of serving cell *c for E-UTRA and NR* respectively, expressed in linear scale.

The measured total configured maximum output power PUMAX shall be within the following bounds:

PCMAX\_L -TLOW (PCMAX\_L) ≤ PUMAX  ≤ PCMAX\_H + THIGH (PCMAX\_H)

with the tolerances TLOW(PCMAX\_H) and THIGH(PCMAX\_H) for applicable values of PCMAX specified in Table 6.2B.4.1.3-2.

When an UL subframe transmission *p* from E-UTRA overlap with a physical-channel *q* from the NR*,* then for PUMAX evaluation, the E-UTRA subframe *p* is takenas reference period TREF and always considered as the reference measurement duration and the following rules are applicable.

TREF and Teval are specified in Table 6.2B.4.1.3-1 when same or different subframe and physical-channel durations are used in aggregated carriers. The lesser of PPowerClass ,EN-DC and PEMAX,EN-DC shall not be exceeded by the UE during any evaluation period of time.

Table 6.2B.4.1.3-1: PCMAX evaluation window

|  |  |  |
| --- | --- | --- |
| transmission duration | TREF | Teval |
| Different transmission duration in different RAT carriers | E-UTRA Subframe on all aggregated cells of E-UTRA | Min(*Tno\_hopping*, Physical Channel Length) on all aggregated cells of NR |

For each TREF, the PCMAX\_H is evaluated per Teval and given by the maximum value over the transmission(s) within the Teval as follows:

PCMAX\_H = MAX { PCMAX\_ EN-DC \_H (*p,q*) , PCMAX\_ EN-DC \_H (*p,q+1*), … , PCMAX\_ EN-DC \_H (*p,q+n*) }

where PCMAX\_ EN-DC \_H are the applicable upper limits for each overlapping scheduling unit pairs *(p,q*) , (*p, q+1*) , up to *(p, q+n*) for each applicable Teval duration, where q+*n* is the last NR UL physical-channel overlapping with E-UTRA subframe p.

While PCMAX\_L is computed as follows:

PCMAX\_L = MIN { PCMAX\_ EN-DC \_L (*p,q*) , PCMAX\_ EN-DC \_L (*p,q+1*), … , PCMAX\_ EN-DC \_L (*p,q+n*)}

where PCMAX\_EN-DC\_L are the applicable lower limits for each overlapping scheduling unit pairs *(p,q*) , (*p, q+1*) , up to *(p, q+n*) for each applicable Teval duration, where q+*n* is the last NR UL physical-channel overlapping with E-UTRA subframe p,

With

PCMAX\_ EN-DC \_H(*p,q*) = MIN {10 log10 [pCMAX H \_E-UTRA,*c* (*p*) + pCMAX H,f,*c,NR* (*q*)], PEMAX, EN-DC ,PPowerClass, EN-DC}

And:

a= 10 log10 [pCMAX\_E-UTRA,*c* (*p*) +pCMAX,f,*c,NR* (*q*) ] >

b= 10 log10 [pCMAX\_E-UTRA,*c* (*p*) +pCMAX,f,*c,NR* (*q*) /X\_scale] >

If a= FALSE

PCMAX\_ EN-DC \_L(*p,q*) = MIN {10 log10 [pCMAX L \_E-UTRA,*c* (*p*) + pCMAX L,f,*c,NR* (*q*)], PEMAX, EN-DC ,PPowerClass, EN-DC}

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

PCMAX\_ EN-DC \_L(*p,q*) = MIN {10 log10 [pCMAX L \_E-UTRA,*c* (*p*) + pCMAX L,f,*c,NR* (*q*) /X\_scale ], PEMAX, EN-DC ,PPowerClass, EN-DC}

ELSE If b= TRUE

PCMAX\_ EN-DC \_L(*p,q*) = MIN {10 log10 [pCMAX L \_E-UTRA,*c* (*p*) ], PEMAX, EN-DC ,PPowerClass, EN-DC}

where

- pCMAX H \_E-UTRA,*c* (*p*) is the E-UTRA higher limit of the maximum configured power expressed in linear scale;

- pCMAX L,f,*c,NR* (*q*) is the NR higher limit of the maximum configured power expressed in linear scale;

- pCMAX L \_E-UTRA,*c* (*p*) is the E-UTRA lower limit of the maximum configured power expressed in linear scale;

- pCMAX L,f,*c,NR* (*q*) is the NR lower limit of the maximum configured power expressed in linear scale;

- PPowerClass, EN-DC is defined in clause 6.2B.1.3-1 for inter-band EN-DC;

- X\_scale is the linear value of X dB which is configured by RRC and can only take values [0 , 6]

- pCMAX\_ E-UTRA,c (p) is the linear value of PCMAX\_ E-UTRA,c (p), the configured max power for E-UTRA. If more than one E-UTRA uplink serving cell is configured as intra-band UL CA in the E-UTRA CG, PCMAX\_ E-UTRA,c (p) will be replaced by PCMAX(p) which is the configured maximum power for the entire E-UTRA CG.

- pCMAX,f,c,NR (q) is the linear value of PCMAX,f,c,NR (q), the configured max power of NR, If more than one NR uplink serving cell is configured as intra-band UL CA in the NR CG, PCMAX\_ NR,c (q) will be replaced by PCMAX(q) which is the configured maximum power for the entire NR CG.

Table 6.2B.4.1.3-2: PCMAX tolerance for Dual Connectivity E-UTRA-NR

|  |  |  |
| --- | --- | --- |
| PCMAX(dBm) | Tolerance  TLOW (PCMAX\_L) (dB) | Tolerance  THIGH (PCMAX\_H) (dB) |
| 23 ≤ PCMAX ≤ 33 | 3.0 | 2.0 |
| 22 ≤ PCMAX < 23 | 5.0 | 2.0 |
| 21 ≤ PCMAX< 22 | 5.0 | 3.0 |
| 20 ≤ PCMAX < 21 | 6.0 | 4.0 |
| 16 ≤ PCMAX < 20 | 5.0 | |
| 11 ≤ PCMAX < 16 | 6.0 | |
| -40 ≤ PCMAX < 11 | 7.0 | |
| NOTE 1: For UEs not indicating support of dynamic power sharing, the upper tolerance Thigh shall be reduced by 0.3 dB for P ≥ 20 dBm. | | |

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

10log(pCMAX L,f,*c,NR* (*q*)/X\_scale) – TLOW (10log(pCMAX L,f,*c,NR* (*q*)/X\_scale) )} ≤ PUMAX,f,*c,NR* (*q*) ≤ 10log(pCMAX H, f,*c,NR* (*q*)) + THIGH (10log(pCMAX H, f,*c,NR* (*q*))).

with the tolerances TLOW and THIGH for applicable values of PCMAX specified in Table 6.2B.4.1.3-2.

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

For inter-band dual connectivity with one uplink serving cell per CG on E-UTRA and NR respectively, the UE is allowed to set its configured maximum output power PCMAX,*c(i),i* for serving cell *c(i)* of CG *i, i = 1,2*, and its total configured maximum transmission power for NE-DC operation, = 10log10() with as specified in clause 7.6.1A of TS 38.213 [10].

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

PCMAX\_L\_E-UTRA,*c* (*p*) ≤ PCMAX\_E-UTRA,*c* (*p*) ≤ PCMAX H \_E-UTRA,*c* (*p*)

where PCMAX\_L\_E-UTRA,*c* andPCMAX H \_E-UTRA,*c* are the limits for a serving cell *c* as specified in TS 36.101 [4] clause 6.2.5 modified by PLTE as follows:

PCMAX\_L\_E-UTRA,*c* = MIN { PEMAX, NE-DC , (PPowerClass, NE-DC – ΔPPowerClass,NE-DC ), MIN(PEMAX,*c*, PLTE) – tC\_ E-UTRA, *c*, (PPowerClass,E-UTRA – ΔPPowerClass,E-UTRA) – MAX(MPR*c* + A-MPR*c* + ΔTIB,c + TC\_ E-UTRA, *c* + TProSe, P-MPR*c*)}

PCMAX H \_E-UTRA,*c* = MIN {PEMAX,*c*, PEMAX, EN-DC , (PPowerClass, NE-DC – ΔPPowerClass,NE-DC ), PLTE, PPowerClass,E-UTRA – ΔPPowerClass,E-UTRA}

with exception that

- if no symbol of slot  of the NR that is indicated as uplink or flexible by *TDD-UL-DL-ConfigurationCommon* or *TDD*-*UL-DL-ConfigDedicated* overlaps with subframe  of the E-UTRA; or

- if NR slot(s) that is indicated as downlink by *TDD-UL-DL-ConfigurationCommon* or *TDD*-*UL-DL-ConfigDedicated* does not overlap with subframe  of the E-UTRA; then

PCMAX\_L\_E-UTRA,*c* = MIN { PEMAX, NE-DC , (PPowerClass, NE-DC – ΔPPowerClass,NE-DC ), PEMAX,*c* – tC\_ E-UTRA, *c*, (PPowerClass,E-UTRA – ΔPPowerClass,E-UTRA) – MAX(MPR*c* + A-MPR*c* + ΔTIB,c + TC\_ E-UTRA, *c* + TProSe, P-MPR*c*)}

PCMAX H \_E-UTRA,*c* = MIN {PEMAX,*c*, PEMAX, EN-DC , (PPowerClass, NE-DC – ΔPPowerClass,NE-DC ), PPowerClass,E-UTRA – ΔPPowerClass,E-UTRA}

The configured maximum output power PCMAX,f,*c,NR* (*q*) in physical-channel *q* for the configured NR carrier shall be set within the bounds:

PCMAX\_L,f,*c,NR* (*q*) ≤ PCMAX,f,*c,NR* (*q*) ≤ PCMAX\_H,f,*c,NR* (*q*)

where PCMAX\_L,f,*c,NR* andPCMAX\_H,f,*c,NR* are the limits for a serving cell c as specified in clause 6.2.4 of TS 38.101-1 [2] modified by PNR as follows:

PCMAX\_L,f,*c,NR* = MIN { PEMAX, NE-DC , (PPowerClass, NE-DC – ΔPPowerClass,NE-DC ), MIN(PEMAX,c , PNR ) - TC\_NR, *c*, (PPowerClass,NR – ΔPPowerClass,NR) – MAX(MPRc + A-MPRc+ ΔTIB,c + TC\_NR, *c* + ∆TRxSRS, P-MPRc) }

PCMAX\_H,f,*c,NR* = MIN {PEMAX,c, PEMAX, NE-DC , (PPowerClass, NE-DC – ΔPPowerClass,NE-DC ), PNR , PPowerClass,NR – ΔPPowerClass,NR }

- PLTE signalled by RRC as *p-maxEUTRA-r15* in TS 36.331 [8]; if *p-maxEUTRA-r15* is not indicated, the value of PLTE is evaluated as infinity in the configured output power calculation;

- PNR signalled by RRC as *p-NR-FR1* defined in TS 38.331 [9]; if *p-NR-FR1* is not indicated, the value of PNR is evaluated as infinity in the configured output power calculation;

- ΔTc\_E-UTRA, *c* = 1.5dB when NOTE 2 in Table 6.2.2-1 in TS 36.101 [4] applies for a serving cell *c*, otherwise TC\_ E-UTRA,*c* = 0dB;

- TC\_NR,*c* = 1.5dB when NOTE 3 in Table 6.2.1-1 in TS 38.101-1 [2] applies for a serving cell *c*, otherwise TC\_NR,*c* = 0dB;

- ΔTIB,c specified in clause 6.2B.4.2.3 for NE-DC, the individual Power Class defined in table 6.2B.1.3a and any other additional power reductions parameters specified in clauses 6.2B.2.3a for NE-DC are applicable to PCMAX\_E-UTRA,*c* and PCMAX,f,*c,NR* evaluations.

- PPowerClass, NE-DC is defined in clause 6.2B.1.3a for inter-band NE-DC;

- PPowerClass,NR is the nominal UE power of the power class that the UE supports for the NR band of the EN-DC combination as defined in clause 6.2.1 of 38.101-1 [2]; in case IE [*powerClassNRPart*] as defined in TS 38.331 [9] is indicated, PPowerClass,NR should use that value instead.

- PPowerClass,E-UTRA is the nominal UE power of the power class that the UE supports for the E-UTRA band of the EN-DC combination as defined in clause 6.2.2 of 36.101 [4];

- ΔPPowerClass,NE-DC = 3 dB for a power class 2 capable NE-DC UE when requirements of default power class had been applied as specified in sub-clause 6.2B.1; otherwise ΔPPowerClass,NE-DC = 0 dB;

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

= 10log10() with the configured maximum transmission power for NE-DC operation as specified in clause 7.6 of TS 38.213 [10].

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

= MIN { PEMAX, NE-DC ,PPowerClass, NE-DC – ΔPPowerClass, NE-DC }

If the UE does not support dynamic power sharing,

= MIN { PEMAX, NE-DC ,PPowerClass, NE-DC – ΔPPowerClass, NE-DC } + 0.3 dB

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

When a UE supporting dynamic sharing is configured for overlapping E-UTRA uplink and NR uplink transmissions, the UE can set its configured maximum output power PCMAX\_E-UTRA,*c* and PCMAX,f,*c,NR* for the configured E-UTRA and NR uplink carriers, respectively, and its configured maximum transmission power for NE-DC operation, , as specified above.

The measured total maximum output power PUMAX over both CGs/RATs, measured over the transmission reference time duration is

PUMAX = 10 log10 [pUMAX,*c,E-UTRA* + pUMAX,*c,NR*],

where pUMAX,*c,E-UTRA* and pUMAX,*c,NR* denotes the measured output power of serving cell *c for E-UTRA and NR* respectively, expressed in linear scale.

The measured total configured maximum output power PUMAX shall be within the following bounds:

PCMAX\_L -TLOW (PCMAX\_L) ≤ PUMAX  ≤ PCMAX\_H + THIGH (PCMAX\_H)

with the tolerances TLOW(PCMAX\_L) and THIGH(PCMAX\_H) for applicable values of PCMAX specified in Table 6.2B.4.1.3a-2.

When an UL subframe transmission *p* from E-UTRA overlap with a physical-channel *q* from the NR*,* then for PUMAX evaluation, the E-UTRA subframe *p* is takenas reference period TREF and always considered as the reference measurement duration and the following rules are applicable.

TREF and Teval are specified in Table 6.2B.4.1.3a-1 when same or different subframe and physical-channel durations are used in aggregated carriers. PPowerClass ,NE-DC shall not be exceeded by the UE during any evaluation period of time.

Table 6.2B.4.1.3a-1: PCMAX evaluation window

|  |  |  |
| --- | --- | --- |
| transmission duration | TREF | Teval |
| Different transmission duration in different RAT carriers | LTE Subframe | Min(*Tno\_hopping*, Physical Channel Length) |

For each TREF, the PCMAX\_H is evaluated per Teval and given by the maximum value over the transmission(s) within the Teval as follows:

PCMAX\_H = MAX { PCMAX\_ NE-DC \_H (*p,q*) , PCMAX\_ NE-DC \_H (*p,q+1*), … , PCMAX\_ NE-DC \_H (*p,q+n*) }

where PCMAX\_ NE-DC \_H are the applicable upper limits for each overlapping scheduling unit pairs *(p,q*) , (*p, q+1*) , up to *(p, q+n*) for each applicable Teval duration, where q+*n* is the last NR UL physical-channel overlapping with LTE subframe p.

While PCMAX\_L is computed as follows:

PCMAX\_L = MIN { PCMAX\_ NE-DC \_L (*p,q*) , PCMAX\_ NE-DC \_L (*p,q+1*), … , PCMAX\_ NE-DC \_L (*p,q+n*)}

where PCMAX\_NE-DC\_L are the applicable lower limits for each overlapping scheduling unit pairs *(p,q*) , (*p, q+1*) , up to *(p, q+n*) for each applicable Teval duration, where q+*n* is the last NR UL physical-channel overlapping with LTE subframe p,

With

PCMAX\_ NE-DC \_H(*p,q*) = MIN {10 log10 [pCMAX H \_E-UTRA,*c* (*p*) + pCMAX H,f,*c,NR* (*q*)], PEMAX, NE-DC ,PPowerClass, NE-DC}

And:

a = 10 log10 [pCMAX\_E-UTRA,*c* (*p*) +pCMAX,f,*c,NR* (*q*) ] >

If a = TRUE

PCMAX\_ NE-DC \_L(*p,q*) = MIN {10 log10 [pCMAX L \_E-UTRA,*c* (*p*) ], PEMAX, NE-DC ,PPowerClass, NE-DC}

Else

PCMAX\_ NE-DC \_L(*p,q*) = MIN {10 log10 [pCMAX L \_E-UTRA,*c* (*p*) + pCMAX L,f,*c,NR* (*q*)], PEMAX, NE-DC ,PPowerClass, NE-DC}

where

- pCMAX H \_E-UTRA,*c* (*p*) is the E-UTRA higher limit of the maximum configured power expressed in linear scale;

- pCMAX H,f,*c,NR* (*q*) is the NR higher limit of the maximum configured power expressed in linear scale;

- pCMAX L \_E-UTRA,*c* (*p*) is the E-UTRA lower limit of the maximum configured power expressed in linear scale;

- pCMAX L,f,*c,NR* (*q*) is the NR lower limit of the maximum configured power expressed in linear scale;

- PPowerClass, NE-DC is defined in clause 6.2B.1.3a for inter-band NE-DC;

- pCMAX\_ E-UTRA,c (p) is the linear value of PCMAX\_ E-UTRA,c (p), the real configured max power for E-UTRA

- pCMAX,f,c,NR (q) is the linear value of PCMAX,f,c,NR (q), the real configured max power of NR

Table 6.2B.4.1.3a-2: PCMAX tolerance for Dual Connectivity E-UTRA-NR

|  |  |  |
| --- | --- | --- |
| PCMAX(dBm) | Tolerance  TLOW (PCMAX\_L) (dB) | Tolerance  THIGH (PCMAX\_H) (dB) |
| 23 ≤ PCMAX ≤ 33 | 3.0 | 2.0 |
| 22 ≤ PCMAX < 23 | 5.0 | 2.0 |
| 21 ≤ PCMAX< 22 | 5.0 | 3.0 |
| 20 ≤ PCMAX < 21 | 6.0 | 4.0 |
| 16 ≤ PCMAX < 20 | 5.0 | |
| 11 ≤ PCMAX < 16 | 6.0 | |
| -40 ≤ PCMAX < 11 | 7.0 | |
| NOTE 1: For UEs not indicating support of dynamic power sharing, the upper tolerance Thigh shall be reduced by 0.3 dB for P ≥ 20 dBm. | | |

When E-UTRA and NR transmissions overlap and the condition a = TRUE, PUMAX,f,*c,NR* (*q*) for MCG, under nominal conditions, shall meet

PUMAX,f,*c,NR* (*q*) ≤ 10log(pCMAX H, f,*c,,NR* *c* (*q*)) + THIGH (10log(pCMAX H, f,*c,,NR* *c* (*q*))).

with the tolerances TLOW and THIGH for applicable values of PCMAX specified in Table 6.2B.4a.1.3-2.

When LTE and NR transmissions overlap and the condition a = FALSE), then PUMAX, under nominal conditions, shall be within the following bounds:

PCMAX\_L -TLOW (PCMAX\_L) ≤ PUMAX  ≤ PCMAX\_H + THIGH (PCMAX\_H)

where PCMAX\_L, PCMAX\_H, and PUMAX are specified above with the tolerances TLOW and THIGH specified in Table 6.2B.4a.1.3-2 for applicable values of PCMAX\_L and PCMAX\_H.

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

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

The UE maximum configured power PCMAX,c(i), on E-UTRA for the subframe i shall be set according to clause 6.2.5 from TS 36.101 [4]. Applicable inter-band ΔTIB,c parameters shall be used according to the clauses 6.2B.4.2.4 or 6.2B.4.2.5.

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

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

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

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

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

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

– For serving cell on FR2, the requirements specified in clause 6.2.4 in TS 38.101-2 [3] apply to the UE maximum configured power PCMAX,c(3),3 and the measured maximum configured power.

– For remaining inter-band dual connectivity involving CG1 and CG2, the requirements specified in clause 6.2B.4.1.3 apply.

## ***<Next change>***

## 6.2E Transmitter power for V2X

### 6.2E.1 UE maximum output power for V2X

#### 6.2E.1.1 General

When NR V2X UE is configured for NR V2X sidelink transmissions non-concurrent with NR uplink transmissions for NR V2X operating bands specified in Table 5.2E.1-1, the allowed NR V2X UE maximum output power is specified in Table 6.2E.1.1-0.

Table 6.2E.1.1-0: NR V2X UE Power Class

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| NR band | Class 1 (dBm) | Tolerance (dB) | Class 2 (dBm) | Tolerance (dB) | Class 3 (dBm) | Tolerance (dB) |
| n38 |  |  |  |  | 23 | ±2 |
| n47 |  |  |  |  | 23 | ±2 |

When a UE is configured for NR V2X sidelink transmissions in NR Band n47, the V2X UE shall meet the following additional requirements for transmission within the frequency ranges 5855-5925 MHz:

- The maximum mean power spectral density shall be restricted to 23 dBm/MHz EIRP when the network signaling value NS\_33 is indicated.

where the network signaling values are specified in clause 6.2E.3.

NOTE: The PSD limit in EIRP shall be converted to conducted requirement depend on the supported post antenna connector gain Gpost connector declared by the UE following the principle described in annex I in [11].

For NR V2X UE supporting SL MIMO, the maximum output power requirements in Table 6.2E.1.1-1 shall be met with the SL MIMO configurations specified in Table 6.2D.1-2. The maximum output power is defined as the sum of the maximum output power from each UE antenna connector. The period of measurement shall be at least one sub frame (1 ms).

Table 6.2E.1.1-1: NR V2X UE Power Class for SL-MIMO

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR band | Class 1 (dBm) | Tolerance (dB) | Class 2 (dBm) | Tolerance (dB) | Class 3 (dBm) | Tolerance (dB) | Class 4 (dBm) | Tolerance (dB) |
| n38 |  |  |  |  | 23 | +2/-3 |  |  |
| n47 |  |  |  |  | 23 | +2/-3 |  |  |

If the UE transmits on one antenna connector at a time, the requirements in Table 6.2E.1.1-0 shall apply to the active antenna connector.

#### 6.2E.1.2 UE maximum output power for V2X con-current operation

For the NR V2X inter-band con-current operation, the maximum output power is specified in Table 6.2E.1.2-1 for each operating band. The period of measurement shall be at least one sub frame (1ms).

Table 6.2E.1.2-1: Power Class for NR V2X inter-band con-current combination (two bands)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR V2X con-current operating band Configuration | NR band | Class 1 (dBm) | Tolerance (dB) | Class 2 (dBm) | Tolerance  (dB) | Class 3 (dBm) | Tolerance (dB) | Class 4 (dBm) | Tolerance (dB) |
| V2X\_n71A-n47A | n71 |  |  |  |  | 23 | +2/-34 |  |  |
|  | n47 |  |  |  |  | 23 | +2/-3 |  |  |
| NOTE 1: For the con-current band combinations, the simultaneous transmission and reception of sidelink and Uu interfaces can be supported while operation is agnostic of the service used on each interface.  NOTE 2: PPowerClass is the maximum output power specified without taking into account the tolerance for each operating band.  NOTE 3: For inter-band con-current operation, the aggregation power apply to the total transmitted power over all component carriers (per UE).  NOTE 4: 4 refers to the transmission bandwidths (Figure 5.6-1) confined within FUL\_low and FUL\_low + 4 MHz or FUL\_high – 4 MHz and FUL\_high, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB | | | | | | | | | |

## ***<Next change>***

### 6.2E.2 UE maximum output power reduction for V2X

#### 6.2E.2.3 MPR for Power class 2 and Power class 3 V2X con-current operation

For the inter-band con-current NR V2X operation, the allowed maximum power reduction (MPR) for the maximum output power shall be applied per each component carrier. The MPR requirements in clause 6.2.2 apply for NR Uu operation in licensed band, and the MPR requirements in clause 6.2E.2 apply for NR sidelink operation in licensed band or Band n47.

### 6.2E.3 UE additional maximum output power reduction for V2X

#### 6.2E.3.2 A-MPR for V2X UE by NS\_33

## ***<<Unchanged part>>***

A-MPRBase and A-MPRStep are specified in Tables 6.2E.3.2-1, 6.2E.3.2-2 is allowed when network signalling value is provided*.* A-MPRBase is the default A-MPR value when no Gpost connector is declared. The supported post antenna connector gain Gpost connector is declared by the UE following the principle described in annex I in [11]. The A-MPRstep is the increase in A-MPR allowance to allow UE to meet tighter conducted A-SE and A-SEM requirements with higher value of declared Gpost connector.

## ***<Next change>***

## 6.2F Transmitter power for shared spectrum channel access

### 6.2F.2 UE maximum output power reduction

For UE maximum output power reduction, the general requirements of clause 6.2.2 do not apply but instead the UE is allowed to reduce the maximum output power due to higher order modulations and transmit bandwidth configurations for power class 5 according to Table 6.2F.2-1 and Table 6.2F.2-2.

Table 6.2F.2-1 Maximum power reduction (MPR) for shared spectrum access UE power class 5

|  |  |  |  |
| --- | --- | --- | --- |
| Pre-coding | Modulation | RB Allocation | |
|  |  | Full2 (dB) | Partial3 (dB) |
| DFT-s-OFDM | Pi/2 BPSK4 | ≤ 1.5 | ≤ 2.5 |
|  | QPSK | ≤ 1.5 | ≤ 2.5 |
|  | 16 QAM | ≤ 2.0 | ≤ 3.0 |
|  | 64 QAM | ≤ 3.5 | ≤ 4.5 |
|  | 256 QAM | ≤ 5.0 | ≤ 5.5 |
| CP-OFDM | QPSK | ≤ 3.5 | ≤ 3.5 |
|  | 16 QAM | ≤ 4.0 | ≤ 4.0 |
|  | 64 QAM | ≤ 5.5 | ≤ 5.5 |
|  | 256 QAM | ≤ 7.0 | ≤ 7.0 |
| NOTE 1: The MPR shall apply to all SCS in all active 20 MHz sub-bands contiguously allocated in the channel. The MPR applies to interlaced allocations with uplink resource allocation type 2 as specified in TS 38.214 [10].  NOTE 2: Full RB allocation MPR applies when all RB’s in a 20 MHz channel or all RB’s in all sub-bands for wideband operation are fully allocated and sub-bands are transmitted according to configuration A in Table 6.2F.2-2.  NOTE 3: Partial RB allocation MPR applies when one or more RB’s in one or more sub-bands are not allocated or when the transmitted sub-bands for wideband operation are transmitted according to configuration B in Table 6.2F.2-2.  NOTE 4: Applicable to Pi/2-BPSK modulation when IE powerBoostPi2BPSK is set to 0. | | | |

#### 6.2F.3.2 A-MPR for NS\_28

When "NS\_28" is indicated in the cell, the A-MPR is specified in Table 6.2F.3.2-1.

Table 6.2F.3.2-1: A-MPR for NS\_28 power class 5

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Pre-coding | Modulation | RB Allocation (Note 2) | | RB Allocation (Note 3) |
|  |  | Full (dB) | Partial (dB) | Full/Partial |
| DFT-s-OFDM | QPSK | ≤ 4.0 | ≤ 6.0 | See Table 6.2F.2-1 |
|  | 16 QAM | ≤ 4.5 | ≤ 6.0 |  |
|  | 64 QAM | ≤ 4.5 | ≤ 6.5 |  |
|  | 256 QAM | ≤ 5.5 | ≤ 6.5 |  |
| CP-OFDM | QPSK | ≤ 6.0 | ≤ 7.0 |  |
|  | 16 QAM | ≤ 6.0 | ≤ 7.5 |  |
|  | 64 QAM | ≤ 6.5 | ≤ 7.5 |  |
|  | 256 QAM | ≤ 7.0 | ≤ 7.5 |  |
| NOTE 1: Full allocation A-MPR applies when all RB’s in a 20 MHz channel or all RB’s in all sub-bands for wideband operation are fully allocated and all sub-bands are transmitted. Partial allocation A-MPR applies when one or more RB’s in one or more sub-bands are not allocated or when not all transmitted sub-bands for wideband operation are transmitted.  NOTE 2: Applicable for 20 MHz channels centered at the nearest NR-ARFCN corresponding to 5160, 5340, 5480, and 5700 MHz, 40 MHz channels centered at the nearest NR-ARFCN corresponding to 5170, 5190, 5310, 5330, 5490, and 5510 MHz, 60 MHz channels centered at the nearest NR-ARFCN corresponding to 5180, 5200, 5220, 5280, 5300, 5320, 5500, 5520, 5540, 5680 MHz, and 80 MHz channels centered at the nearest NR-ARFCN corresponding to 5190, 5210, 5290, 5310, 5510, and 5530 MHz.  NOTE 3: Applicable for all valid channels other than those enumerated under NOTE 2. | | | | |

#### 6.2F.3.3 A-MPR for NS\_29

When "NS\_29" is indicated in the cell, the A-MPR is specified in Table 6.2F.3.3-1.

Table 6.2F.3.3-1: A-MPR for NS\_29 power class 5

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Pre-coding | Modulation | Channel bandwidth (Sub-band allocation) / RB Allocation | | | | |
|  |  | 20 MHz | 40 MHz | | 60 MHz, 80 MHz | |
|  |  | Full/Partial | Full (dB) | Partial (dB) | Full (dB) | Partial (dB) |
| DFT-s-OFDM | QPSK | See Table 6.2F.2-1 | ≤ 2.0 | ≤ 4.0 | ≤ 4.0 | ≤ 6.0 |
|  | 16 QAM |  | ≤ 2.5 | ≤ 4.0 | ≤ 4.0 | ≤ 6.0 |
|  | 64 QAM |  | ≤ 3.5 | ≤ 4.0 | ≤ 4.5 | ≤ 6.0 |
|  | 256 QAM |  | ≤ 5.0 | ≤ 5.5 | ≤ 5.5 | ≤ 6.0 |
| CP-OFDM | QPSK |  | ≤ 3.5 | ≤ 4.5 | ≤ 4.0 | ≤ 6.0 |
|  | 16 QAM |  | ≤ 4.0 | ≤ 4.5 | ≤ 4.0 | ≤ 6.0 |
|  | 64 QAM |  | ≤ 5.5 | ≤ 5.0 | ≤ 5.5 | ≤ 6.5 |
|  | 256 QAM |  | ≤ 7.0 | ≤ 6.5 | ≤ 7.0 | ≤ 7.0 |
| NOTE 1: Full allocation A-MPR applies when all RB’s in a 20 MHz channel or all RB’s in all sub-bands for wideband operation are fully allocated and all sub-bands are transmitted. Partial allocation A-MPR applies when one or more RB’s in one or more sub-bands are not allocated but when all sub-bands within the channel are transmitted. When not all sub-bands within the channel are transmitted, the A-MPR associated with the channel bandwidth according to the bandwidth of the contiguously transmitted sub-bands and according to the allocation type applies. | | | | | | |

#### 6.2F.3.4 A-MPR for NS\_30

When "NS\_30" is indicated in the cell, the A-MPR is specified in Table 6.2F.3.4-1.

Table 6.2F.3.4-1: A-MPR for NS\_30 power class 5

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Pre-coding | Modulation | RB Allocation (Note 2) | | RB Allocation (Note 3) | | RB Allocation (Note 4) |
|  |  | Full (dB) | Partial (dB) | Full (dB) | Partial (dB) | Full/Partial |
| DFT-s-OFDM | QPSK | ≤ 9.0 | ≤ 15.0 | ≤ 2.5 | ≤ 5.0 | See Table 6.2F.2-1 |
|  | 16 QAM | ≤ 9.0 | ≤ 15.5 | ≤ 3.0 | ≤ 5.0 |  |
|  | 64 QAM | ≤ 9.0 | ≤ 15.5 | ≤ 4.5 | ≤ 5.5 |  |
|  | 256 QAM | ≤ 9.0 | ≤ 16.0 | ≤ 5.5 | ≤ 5.5 |  |
| CP-OFDM | QPSK | ≤ 9.0 | ≤ 14.0 | ≤ 4.0 | ≤ 6.0 |  |
|  | 16 QAM | ≤ 9.5 | ≤ 14.5 | ≤ 4.0 | ≤ 6.0 |  |
|  | 64 QAM | ≤ 9.5 | ≤ 15.0 | ≤ 5.5 | ≤ 6.5 |  |
|  | 256 QAM | ≤ 9.5 | ≤ 15.0 | ≤ 7.0 | ≤ 7.0 |  |
| NOTE 1: Full allocation A-MPR applies when all RB’s in a 20 MHz channel or all RB’s in all sub-bands for wideband operation are fully allocated and all sub-bands are transmitted. Partial allocation A-MPR applies when one or more RB’s in one or more sub-bands are not allocated or when not all transmitted sub-bands for wideband operation are transmitted.  NOTE 2: Applicable for 20 MHz channels centered at the nearest NR-ARFCN corresponding to 5160, 5340, 5480, and 5700 MHz, 40 MHz channels centered at the nearest NR-ARFCN corresponding to 5170, 5190, 5310, 5330, 5490, and 5510 MHz, 60 MHz channels centered at the nearest NR-ARFCN corresponding to 5180, 5200, 5220, 5280, 5300, 5320, 5500, 5520, 5540, 5680 MHz, and 80 MHz channels centered at the nearest NR-ARFCN corresponding to 5190, 5210, 5290, 5310, 5510, and 5530 MHz.  NOTE 3: Applicable for 20 MHz channels centered at the nearest NR-ARFCN corresponding to 5180 and 5320 MHz, and 40 MHz channels centered at the nearest NR-ARFCN corresponding to 5230 and 5270 MHz.  NOTE 4: Applicable for all valid channels other than those enumerated under NOTE 2 and NOTE 3. | | | | | | |

#### 6.2F.3.5 A-MPR for NS\_31

When "NS\_31" is indicated in the cell, the A-MPR is specified in Table 6.2F.3.5-1.

Table 6.2F.3.5-1: A-MPR for NS\_31 power class 5

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Pre-coding | Modulation | RB Allocation (Note 2) | RB Allocation (Note 3) | |
|  |  | Full/Partial | Full (dB) | Partial (dB) |
| DFT-s-OFDM | QPSK | See Table 6.2F.2-1 | ≤ 4.0 | ≤ 6.5 |
|  | 16 QAM |  | ≤ 4.0 | ≤ 6.5 |
|  | 64 QAM |  | ≤ 4.0 | ≤ 6.5 |
|  | 256 QAM |  | ≤ 5.0 | ≤ 6.5 |
| CP-OFDM | QPSK |  | ≤ 5.5 | ≤ 6.5 |
|  | 16 QAM |  | ≤ 5.5 | ≤ 7.0 |
|  | 64 QAM |  | ≤ 5.5 | ≤ 7.0 |
|  | 256 QAM |  | ≤ 7.0 | ≤ 7.0 |
| NOTE 1: Full allocation A-MPR applies when all RB’s in a 20 MHz channel or all RB’s in all sub-bands for wideband operation are fully allocated and all sub-bands are transmitted. Partial allocation A-MPR applies when one or more RB’s in one or more sub-bands are not allocated or when not all transmitted sub-bands for wideband operation are transmitted.  NOTE 2: Applicable for 20 MHz channels centered at the nearest NR-ARFCN corresponding to 5180, 5200, 5220, 5280, 5300, 5320, 5500, 5520, 5540, 5560, 5580, 5600, 5620, 5640, 5660, 5680, 5745, 5765, 5785, and 5805 MHz.  NOTE 3: Applicable for all valid channels and bandwidths other than those enumerated in NOTE 2. | | | | |

#### 6.2F.3.6 A-MPR for NS\_53

When "NS\_53" is indicated in the cell, the A-MPR is specified in Table 6.2F.3.6-1.

Table 6.2F.3.6-1: A-MPR for NS\_53 power class 5

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Pre-coding | Modulation | Channel bandwidth (Sub-band allocation) / RB Allocation | | | | | | | |
|  |  | 20 MHz | | 40 MHz | | 60 MHz | | 80 MHz | |
|  |  | Full (dB) | Partial (dB) | Full (dB) | Partial (dB) | Full (dB) | Partial (dB) | Full (dB) | Partial (dB) |
| DFT-s-OFDM | QPSK | ≤ 9.0 | ≤ 12.0 | ≤ 6.5 | ≤ 8.5 | ≤ 4.5 | ≤ 6.5 | ≤ 3.0 | ≤ 5.5 |
|  | 16 QAM | ≤ 9.0 | ≤ 12.0 | ≤ 6.5 | ≤ 8.5 | ≤ 4.5 | ≤ 6.5 | ≤ 3.0 | ≤ 5.5 |
|  | 64 QAM | ≤ 9.0 | ≤ 12.0 | ≤ 6.5 | ≤ 8.5 | ≤ 4.5 | ≤ 6.5 | ≤ 4.0 | ≤ 5.5 |
|  | 256 QAM | ≤ 9.0 | ≤ 12.0 | ≤ 6.5 | ≤ 8.5 | ≤ 5.0 | ≤ 7.0 | ≤ 5.0 | ≤ 5.5 |
| CP-OFDM | QPSK | ≤ 9.0 | ≤ 12.0 | ≤ 6.5 | ≤ 8.5 | ≤ 4.5 | ≤ 6.5 | ≤ 4.0 | ≤ 5.5 |
|  | 16 QAM | ≤ 9.0 | ≤ 12.0 | ≤ 6.5 | ≤ 8.5 | ≤ 4.5 | ≤ 6.5 | ≤ 4.0 | ≤ 5.5 |
|  | 64 QAM | ≤ 9.0 | ≤ 12.0 | ≤ 6.5 | ≤ 8.5 | ≤ 5.5 | ≤ 6.5 | ≤ 5.5 | ≤ 5.5 |
|  | 256 QAM | ≤ 9.0 | ≤ 12.0 | ≤ 7.0 | ≤ 8.5 | ≤ 7.0 | ≤ 7.0 | ≤ 7.0 | ≤ 7.0 |
| NOTE 1: Full allocation A-MPR applies when all RB’s in a 20 MHz channel or all RB’s in all sub-bands for wideband operation are fully allocated and all sub-bands are transmitted. Partial allocation A-MPR applies when one or more RB’s in one or more sub-bands are not allocated but when all sub-bands within the channel are transmitted. When not all sub-bands within the channel are transmitted, the A-MPR associated with the channel bandwidth according to the bandwidth of the contiguously transmitted sub-bands and according to the allocation type applies. | | | | | | | | | |

#### 6.2F.3.7 A-MPR for NS\_54

When "NS\_54" is indicated in the cell, the A-MPR is specified in Table 6.2F.3.7-1.

Table 6.2F.3.7-1: A-MPR for NS\_54 power class 5

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Pre-coding | Modulation | RB Allocation (Note 2) | RB Allocation (Note 3) | |
|  |  | Full/Partial | Full (dB) | Partial (dB) |
| DFT-s-OFDM | QPSK | See Table 6.2F.2-1 | ≤ 2.5 | ≤ 5.0 |
|  | 16 QAM |  | ≤ 3.0 | ≤ 5.0 |
|  | 64 QAM |  | ≤ 3.5 | ≤ 5.0 |
|  | 256 QAM |  | ≤ 5.0 | ≤ 6.0 |
| CP-OFDM | QPSK |  | ≤ 4.5 | ≤ 6.0 |
|  | 16 QAM |  | ≤ 4.5 | ≤ 6.0 |
|  | 64 QAM |  | ≤ 5.5 | ≤ 6.0 |
|  | 256 QAM |  | ≤ 7.0 | ≤ 7.0 |
| NOTE 1: Full allocation A-MPR applies when all RB’s in a 20 MHz channel or all RB’s in all sub-bands for wideband operation are fully allocated and all sub-bands are transmitted. Partial allocation A-MPR applies when one or more RB’s in one or more sub-bands are not allocated or when not all transmitted sub-bands for wideband operation are transmitted.  NOTE 2: Applicable for all valid channels and bandwidths other than those enumerated in NOTE 3.  NOTE 3: Applicable for 40 MHz channels centered at the nearest NR-ARFCN corresponding to [5965 MHz], 60 MHz channels centered at the nearest NR-ARFCN corresponding to [5975 and 5995 MHz], and 80 MHz channels centered at the nearest NR-ARFCN corresponding to [5985 MHz]. | | | | |

## ***<Next change>***

### 6.3.1 Minimum output power

The minimum controlled output power of the UE is defined as the power in the channel bandwidth for all transmit bandwidth configurations (resource blocks), when the power is set to a minimum value.

The minimum output power is defined as the mean power in at least one sub-frame 1 ms. The minimum output power shall not exceed the values specified in Table 6.3.1-1. For UE power class 1.5 the minimum output power is defined as the sum of the minimum output power from both UE antenna connectors.

Table 6.3.1-1: Minimum output power

|  |  |  |
| --- | --- | --- |
| Channel bandwidth  (MHz) | Minimum output power  (dBm) | Measurement bandwidth  (MHz) |
| 5 | -40 | 4.515 |
| 10 | -40 | 9.375 |
| 15 | -40 | 14.235 |
| 20 | -40 | 19.095 |
| 25 | -39 | 23.955 |
| 30 | -38.2 | 28.815 |
| 40 | -37 | 38.895 |
| 50 | -36 | 48.615 |
| 60 | -35.2 | 58.35 |
| 70 | -34.6 | 68.07 |
| 80 | -34 | 78.15 |
| 90 | -33.5 | 88.23 |
| 100 | -33 | 98.31 |

### 6.3.2 Transmit OFF power

## ***<Next change>***

### 6.3.4 Power control

#### 6.3.4.1 General

The requirements on power control accuracy apply under normal conditions. For UE power class 1.5 the power control accuracy requirements apply for the sum of the output power from both UE antenna connectors.

#### 6.3.4.2 Absolute power tolerance

*< text omitted >*

#### 6.4.2.1 Error Vector Magnitude

The Error Vector Magnitude is a measure of the difference between the reference waveform and the measured waveform. This difference is called the error vector. Before calculating the EVM the measured waveform is corrected by the sample timing offset and RF frequency offset. Then the carrier leakage shall be removed from the measured waveform before calculating the EVM.

The measured waveform is further equalised using the channel estimates subjected to the EVM equaliser spectrum flatness requirement specified in clause 6.4.2.4. For DFT-s-OFDM waveforms, the EVM result is defined after the front-end FFT and IDFT as the square root of the ratio of the mean error vector power to the mean reference power expressed as a %. For CP-OFDM waveforms, the EVM result is defined after the front-end FFT as the square root of the ratio of the mean error vector power to the mean reference power expressed as a %.

The basic EVM measurement interval in the time domain is one preamble sequence for the PRACH and one slotfor PUCCH and PUSCH in the time domain. The EVM measurement interval is reduced by any symbols that contains an allowable power transient in the measurement interval, as defined in clause 6.3.3.

The RMS average of the basic EVM measurements over 10 subframes for the average EVM case, and over 60 subframes for the reference signal EVM case, for the different modulation schemes shall not exceed the values specified in Table 6.4.2.1-1 for the parameters defined in Table 6.4.2.1-2. For EVM evaluation purposes, all 13 PRACH preamble formats and all 5 PUCCH formats are considered to have the same EVM requirement as QPSK modulated..

For UE power class 1.5 the EVM is first measured per UE antenna connector and then evaluated according to the measurement method applicable for UEs indicating *txDiverisity-r16*.

Table 6.4.2.1-1: Requirements for Error Vector Magnitude

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Average EVM Level |
| Pi/2-BPSK | % | 30 |
| QPSK | % | 17.5 |
| 16 QAM | % | 12.5 |
| 64 QAM | % | 8 |
| 256 QAM | % | 3.5 |

Table 6.4.2.1-2: Parameters for Error Vector Magnitude

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Level |
| UE Output Power | dBm | ≥ Table 6.3.1-1 |
| UE Output Power for 256 QAM | dBm | ≥ Table 6.3.1-1 + 10 dB |
| Operating conditions |  | Normal conditions |

#### 6.4.2.1a Error Vector Magnitude including symbols with transient period

In 6.4.2.1, EVM has been defined by excluding the symbols which have a transient period. In this section, measurement interval is defined for the symbols with a transient period to include these symbols in the RMS average EVM computation when the UE reports a transient period capability other than the default. Before calculating the EVM, the measured waveform is corrected for sample timing offset and RF frequency offset. Then the carrier leakage shall be removed from the measured waveform before calculating the EVM. The symbols with transient period should not be used for equalization. Only CP-OFDM waveform is used for conformance testing.”

In the case of PUSCH or PUCCH transmissions when the mean power, modulation or RB allocation across slot or subslot boundaries is expected to change the EVM result over the symbols where the transient occurs is calculated according to Table 6.4.2.1a-1.

Table 6.4.2.1a-1: EVM definition for reported transient period

| Reported transient capability (us) | EVM definition | *tpstart* (µs) | SCS4 |
| --- | --- | --- | --- |
| 2 |  | [-0.5] | 15kHz or 30kHz5 |
| 4 |  | [-1] | 15kHz |
| 7 |  | [-2] | 15kHz |
| NOTE 1:   ,,and are defined in Annex F  NOTE 2:   is the EVM for a symbol right after a transition; is the EVM for a symbol right before a transition  NOTE 3: *tpstart* denotes the start position of the EVM exclusion window as shown in Annex F.4  NOTE 4: SCS denotes the SCS that can be used in the conformance test  NOTE 5: 30kHz shall be used in the conformance test unless the UE signals in ***supportedSubCarrierSpacingUL*** in ***FeatureSetPerCC*** that it only supports 15kHz in the corresponding band | | | |

The RMS average of the basic EVM measurements over [108] subframes for the symbols where the transient occurs for the different modulation schemes shall not exceed the values specified in Table 6.4.2.1a-2 for the parameters defined in Table 6.4.2.1a-3. This requirement can be verified with 64 QAM and 256 QAM modulation.

Table 6.4.2.1a-2: Requirements for Error Vector Magnitude

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Average EVM Level |
| 64 QAM | % | [10] |
| 256 QAM | % | [8] |

Table 6.4.2.1a-3: Parameters for Error Vector Magnitude

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Level |
| UE Output Power | dBm | ≥ Table 6.3.1-1 |
| UE Output Power for 256 QAM | dBm | ≥ Table 6.3.1-1 + 10 dB |
| Operating conditions |  | Normal conditions |

#### 6.4.2.2 Carrier leakage

*< text omitted >*

#### 6.4.2.4 EVM equalizer spectrum flatness

The zero-forcing equalizer correction applied in the EVM measurement process (as described in Annex F) must meet a spectral flatness requirement for the EVM measurement to be valid. The EVM equalizer spectrum flatness is defined in terms of the maximum peak-to-peak ripple of the equalizer coefficients (dB) across the allocated uplink block. The basic measurement interval is the same as for EVM.

The peak-to-peak variation of the EVM equalizer coefficients contained within the frequency range of the uplink allocation shall not exceed the maximum ripple specified in Table 6.4.2.4-1 for normal conditions. For uplink allocations contained within both Range 1 and Range 2, the coefficients evaluated within each of these frequency ranges shall meet the corresponding ripple requirement and the following additional requirement: the relative difference between the maximum coefficient in Range 1 and the minimum coefficient in Range 2 must not be larger than 5 dB, and the relative difference between the maximum coefficient in Range 2 and the minimum coefficient in Range 1 must not be larger than 7 dB (see Figure 6.4.2.4-1).

The EVM equalizer spectral flatness shall not exceed the values specified in Table 6.4.2.4-2 for extreme conditions. For uplink allocations contained within both Range 1 and Range 2, the coefficients evaluated within each of these frequency ranges shall meet the corresponding ripple requirement and the following additional requirement: the relative difference between the maximum coefficient in Range 1 and the minimum coefficient in Range 2 must not be larger than 6 dB, and the relative difference between the maximum coefficient in Range 2 and the minimum coefficient in Range 1 must not be larger than 10 dB (see Figure 6.4.2.4-1).

For UE power class 1.5 the EVM equalizer spectrum flatness is measured according to the measurement method applicable for UEs indicating *txDiverisity-r16*.

Table 6.4.2.4-1: Requirements for EVM equalizer spectrum flatness (normal conditions)

|  |  |
| --- | --- |
| Frequency range | Maximum ripple (dB) |
| FUL\_Meas – FUL\_Low ≥ 3 MHz and FUL\_High – FUL\_Meas ≥ 3 MHz  (Range 1) | 4 (p-p) |
| FUL\_Meas – FUL\_Low < 3 MHz or FUL\_High – FUL\_Meas < 3 MHz  (Range 2) | 8 (p-p) |
| NOTE 1: FUL\_Meas refers to the sub-carrier frequency for which the equalizer coefficient is evaluated  NOTE 2: FUL\_Low and FUL\_High refer to each NR frequency band specified in Table 5.2-1 | |

Table 6.4.2.4-2: Minimum requirements for EVM equalizer spectrum flatness (extreme conditions)

|  |  |
| --- | --- |
| Frequency range | Maximum Ripple (dB) |
| FUL\_Meas – FUL\_Low ≥ 5 MHz and FUL\_High – FUL\_Meas ≥ 5 MHz  (Range 1) | 4 (p-p) |
| FUL\_Meas – FUL\_Low < 5 MHz or FUL\_High – FUL\_Meas < 5 MHz  (Range 2) | 12 (p-p) |
| NOTE 1: FUL\_Meas refers to the sub-carrier frequency for which the equalizer coefficient is evaluated  NOTE 2: FUL\_Low and FUL\_High refer to each NR frequency band specified in Table 5.2-1 | |

**f**

**FUL\_High**

**FUL\_High – 3(5) MHz**

**< 4(4) dBp-p**

**Range 1**

**Range 2**

**max(Range 1)-min(Range 2) < 5(6) dB**

**max(Range 2)-min(Range 1) < 7(10) dB**

**< 8(12) dBp-p**

Figure 6.4.2.4-1: The limits for EVM equalizer spectral flatness with the maximum allowed variation of the coefficients indicated (the ETC minimum requirement are within brackets).

##### 6.4.2.4.1 Requirements for Pi/2 BPSK modulation

*< text omitted >*

## ***<Next change>***

## 6.3A Output power dynamics for CA

## ***<Next change>***

### 6.3A.2 Transmit OFF power for CA

#### 6.3A.2.1 Transmit OFF power for intra-band contiguous CA

For intra-band contiguous carrier aggregation, the transmit OFF power specified in clause 6.3.2 is applicable for each component carrier when the transmitter is OFF on all component carriers. The transmitter is considered to be OFF when the UE is not allowed to transmit on any of its ports.

#### 6.3A.2.2 Transmit OFF power for intra-band non-contiguous CA

For intra-band non-contiguous carrier aggregation, the transmit OFF power specified in clause 6.3.2 is applicable for each component carrier when the transmitter is OFF on all component carriers. The transmitter is considered to be OFF when the UE is not allowed to transmit on any of its ports.

#### 6.3A.2.3 Transmit OFF power for inter-band CA

For inter-band carrier aggregation with one uplink carrier assigned to one NR band, the transmit OFF power requirements in subclause 6.3.2 apply.

For inter-band carrier aggregation with two contiguous carriers assigned to one NR band, the transmit OFF power requirements in subclause 6.3A.2.1 apply for those carriers.

For inter-band carrier aggregation with two uplink non-contiguous carrier assigned to one NR band, the transmit OFF power requirements in subclause 6.3A.2.2 apply for those carriers.

For inter-band carrier aggregation with uplink assigned to two NR bands, the transmit OFF power specified in clause 6.3.2 is applicable for each component carrier when the transmitter is OFF on all component carriers. The transmitter is considered to be OFF when the UE is not allowed to transmit on any of its ports.

For combinations of intra-band and inter-band carrier aggregation with three uplink component carriers (up to two contiguously aggregated carriers per operating band), the transmit OFF power requirements specified in subclause 6.3.2 apply for the NR band supporting one component carrier, and for the NR band supporting two contiguous component carriers the requirements specified in subclause 6.3A.2.1 apply.

### 6.3A.3 Transmit ON/OFF time mask for CA

#### 6.3A.3.1 Transmit ON/OFF time mask for intra-band contiguous CA

For a intra-band contiguous carrier aggregation, the general output power ON/OFF time mask specified in clause 6.3.3.1 is applicable for each component carrier during the ON power period and the transient periods. The OFF period as specified in clause 6.3.3.1 shall only be applicable for each component carrier when all the component carriers are OFF.

#### 6.3A.3.2 Transmit ON/OFF time mask for intra-band non-contiguous CA

For a intra-band non-contiguous carrier aggregation, the general output power ON/OFF time mask specified in clause 6.3.3.1 is applicable for each component carrier during the ON power period and the transient periods. The OFF period as specified in clause 6.3.3.1 shall only be applicable for each component carrier when all the component carriers are OFF.

## ***<Next change>***

### 6.4E.1 Frequency error for V2X

#### 6.4E.1.1 General

The UE modulated carrier frequency for NR V2X sidelink transmissions in Table 5.2E.1-1, shall be accurate to within ±0.1 PPM observed over a period of 1 ms compared to the absolute frequency in case of using GNSS synchronization source. The same requirements applied over a period of 1 ms compared to the carrier frequency received from the gNB or V2X synchronization reference UE in case of using the gNB or V2X synchronization reference UE sidelink synchronization signals.

For NR V2X UE supporting SL MIMO, the UE modulated carrier frequency at each transmit antenna connector shall be accurate to within ±0.1 PPM observed over a period of 1 ms in case of using GNSS synchronization source. The same requirements apply over a period of 1 ms compared to the relative frequency in case of using the NR gNode B or V2X synchronization reference UE sidelink synchronization signals.

If the UE transmits on one antenna connector at a time, the requirements for single carrier shall apply to the active antenna connector.

#### 6.4E.1.2 Frequency error for V2X con-current operation

For the inter-band con-current NR V2X operation, the requirements specified in clause 6.4.1 shall apply for the uplink in licensed band and the requirements specified in clause 6.4E.1.1 shall apply for the sidelink in licensed band or Band n47.

## ***<Next change>***

## 6.3F Output power dynamics for shared spectrum channel access

### 6.3F.4 Power control

#### 6.3F.4.3 Relative power tolerance

The relative power tolerance requirements of clause 6.3.4.3 apply if the transmission gap between the target sub-frame and the reference sub-frame is less than or equal to 40 ms.

## ***<Next change>***

#### 6.4A.2.1 Transmit modulation quality for intra-band contiguous CA

##### 6.4A.2.1.0 General

For intra-band contiguous carrier aggregation, the requirements in clauses 6.4A.2.1.1, 6.4A.2.1.2 applies.

The requirements in this clause apply with PCC and SCC in the UL configured and activated: PCC with PRB allocation and SCC without PRB allocation and without CSI reporting and SRS configured.

In case the parameter 3300 or 3301 is reported from UE via *txDirectCurrentLocation-r16* or *txDirectCurrentLocation* (as defined in TS 38.331 [7]) or UE does not indicate the DC location parameters, carrier leakage measurement requirement in clause 6.4A.2.4.2 shall be waived, and the RF correction with regard to the carrier leakage and IQ image shall be omitted during the calculation of transmit modulation quality.

##### 6.4A.2.1.2 In-band emissions

For intra-band contiguous carrier aggregation, the requirements in Table 6.4A.2.1.2-1 and 6.4A.2.1.2-2 apply within the aggregated transmission bandwidth configuration with both component carrier (s) active and one single contiguous PRB allocation of bandwidth  at the edge of the aggregated transmission bandwidth configuration.

The inband emission is defined as the interference falling into the non allocated resource blocks for all component carriers. The measurement method for the inband emissions in the component carrier with PRB allocation is specified in annex F.3. For a non allocated component carrier a spectral measurement is specified.

Table 6.4A.2.1.2-1: Minimum requirements for in-band emissions (allocated component carrier)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Unit | Limit | | Applicable Frequencies |
| General | dB |  | | Any non-allocated (NOTE 2) |
| IQ Image | dB | -28 | Output power > 10 dBm | Image frequencies  (NOTE 3) |
|  |  | -25 | 0≤ Output power ≤ 10 dBm |  |
| Carrier leakage | dBc | -28 | Output power > 10 dBm | Carrier leakage frequency (NOTE 4,5) |
|  |  | -25 | 0 dBm ≤ Output power ≤ 10 dBm |  |
|  |  | -20 | -30 dBm ≤ Output power ≤ 0 dBm |  |
|  |  | -10 | -40 dBm ≤ Output power < -30 dBm |  |
| NOTE 1: An in-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the minimum requirement is calculated as the higher of - 30 dB and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply. is defined in NOTE 10. The limit is evaluated in each non-allocated RB.  NOTE 2: The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured average power per allocated RB, where the averaging is done across all allocated RBs  NOTE 3: The applicable frequencies for this limit are those that are enclosed in the reflection of the allocated bandwidth, based on symmetry with respect to the carrier leakage frequency, but excluding any allocated RBs.  NOTE 4: Exceptions to the general limit are allowed for up to two contiguous non-allocated RBs. The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in the non-allocated RB to the measured total power in all allocated RBs.  NOTE 5: The applicable frequencies for this limit depend on the parameter *txDirectCurrentLocation-r16* in *UplinkTxDirectCurrentTwoCarrierList* IE indicated in active uplink carrier(s). For band combinations with supporting additional DC location reporting for intra-band CA, the applicable LO leakage frequency depend on the *txDirectCurrentLocation-r16* indicated in the additional reporting IE, and are those that are enclosed either in the RB containing the carrier leakage frequency, or in the two RBs immediately adjacent to the carrier leakage frequency but excluding any allocated RB. Otherwise, the applicable frequencies for this limit depend on the parameter *txDirectCurrentLocation* in *UplinkTxDirectCurrent* IE. For only one uplink carrier is activated, the applicable LO leakage frequency follow definition in clause 6.4.2.  NOTE 6:  is the Transmission Bandwidth (see clause 5.3) not exceeding  .  NOTE 7:  is the Transmission Bandwidth Configuration (see clause 5.3) of the component carrier with RBs allocated.  NOTE 8:  is the limit specified in Table 6.4.2.1-1 for the modulation format used in the allocated RBs.  NOTE 9:  is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g.  or  for the first adjacent RB outside of the allocated bandwidth).  NOTE 10:  is an average of the transmitted power over 10 sub-frames normalized by the number of allocated RBs, measured in dBm. | | | | |

Table 6.4A.2.1.2-2: Minimum requirements for in-band emissions (not allocated component carrier)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Para-meter | Unit | Meas BW  NOTE 1 | Limit | | | remark | Applicable Frequencies |
| General | dB | BW of 1 RB |  | | | The reference value is the average power per allocated RB in the allocated component carrier | Any RB in the non allocated component carrier.  The frequency raster of the RBs is derived when this component carrier is allocated with RBs |
| IQ Image | dB | BW of 1 RB | NOTE 2 | | | The reference value is the average power per allocated RB in the allocated component carrier | The frequencies of the contiguous non-allocated RBs are unknown.  The frequency raster of the RBs is derived when this component carrier is allocated with RBs |
|  |  |  | -28 | Output power > 10 dBm | |  |  |
|  |  |  | -25 | 0≤ Output power ≤ 10 dBm | |  |  |
| Carrier leakage | dBc | BW of 1 RB | NOTE 3 | | | The reference value is the total power of the allocated RBs in the allocated component carrier | The frequencies of the up to 2 non-allocated RBs are unknown.  The frequency raster of the RBs is derived when this component carrier is allocated with RBs |
|  |  |  | -28 | | Output power > 10 dBm |  |  |
|  |  |  | -25 | | 0 dBm ≤ Output power ≤ 10 dBm |  |  |
|  |  |  | -20 | | -30 dBm ≤ Output power ≤ 0 dBm |  |  |
|  |  |  | -10 | | -40 dBm ≤ Output power < -30 dBm |  |  |
| NOTE1: Resolution BWs smaller than the measurement BW may be integrated to achieve the measurement bandwidth.  NOTE 2: Exceptions to the general limit is are allowed for up to +1 RBs within a contiguous width of +1 non-allocated RBs.  NOTE 3: Two Exceptions to the general limit are allowed for up to two contiguous non-allocated RBs  NOTE 4: NOTES 1, 5, 6, 7, 8, 9 from Table 6.4A.2.3.1-1 apply for Table 6.4A.2.3.2-2 as well.  NOTE 5:  for measured non-allocated RB in the non allocated component carrier may take non-integer values when the carrier spacing between the CCs is not a multiple of RB. | | | | | | | |

##### 6.4A.2.1.3 Carrier leakage

Carrier leakage is an additive sinusoid waveform that is confined within the aggregated transmission bandwidth configuration. For intra-band contiguous CA, the carrier leakage requirement is defined with applicable frequencies dependent on parameter *txDirectCurrentLocation-r16*or *txDirectCurrentLocation* (as defined in TS 38.331 [7]). For only one uplink carrier is activated, the applicable LO leakage frequency follow definition in clause 6.4.2.The measurement interval is one slot in the time domain.

The relative carrier leakage power is a power ratio of the additive sinusoid waveform and the modulated waveform. The relative carrier leakage power shall not exceed the values specified in Table 6.4A.2.4.3-1. Carrier leakage frequencies are those that are enclosed either in the RB containing the carrier leakage frequency, or in the two RBs immediately adjacent to the carrier leakage frequency but excluding any allocated RB.

Table 6.4A.2.1.3-1: Minimum requirements for Relative Carrier Leakage Power

|  |  |
| --- | --- |
| Parameters | Relative Limit (dBc) |
| Output power > 10 dBm | -28 |
| 0 dBm ≤ Output power ≤ 10 dBm | -25 |
| -30 dBm ≤ Output power < 0 dBm | -20 |
| -40 dBm ≤ Output power < -30 dBm | -10 |

##### 6.4A.2.2.0 General

For intra-band non-contiguous carrier aggregation, the requirements in subclauses 6.4A.2.2.1, 6.4A.2.2.2 applies.

The requirements in this clause apply with PCC and SCC in the UL configured and activated: PCC with PRB allocation and SCC without PRB allocation and without CSI reporting and SRS configured.

In case the parameter 3300 or 3301 is reported from UE via *txDirectCurrentLocation-r16* or *txDirectCurrentLocation*  (as defined in TS 38.331 [7]), or UE does not indicate the DC location parameters, carrier leakage measurement requirement in subclause 6.4A.2.2.2 shall be waived, and the RF correction with regard to the carrier leakage and IQ image shall be omitted during the calculation of transmit modulation quality.

## ***<Next change>***

## 6.4D Transmit signal quality for UL MIMO

### 6.4D.2 Transmit modulation quality for UL MIMO

#### 6.4D.2.1 Error Vector Magnitude

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the Error Vector Magnitude requirements specified in clause 6.4.2.1 apply per layer. The requirements shall be met with the UL MIMO configurations specified in Table 6.2D.1-2

## ***<Next change>***

### 6.4D.4 Requirements for coherent UL MIMO

For coherent UL MIMO, Table 6.4D.4-1 lists the maximum allowable difference between the measured relative power and phase errors between different antenna connectors in any slot within the specified time window from the last transmitted SRS on the same antenna connectors, for the purpose of uplink transmission (codebook or non-codebook usage) and those measured at that last SRS. The requirements in Table 6.4D.4-1 apply when the UL transmission power at each antenna connector is larger than 0 dBm for SRS transmission and for the duration of time window.

Table 6.4D.4-1: Maximum allowable difference of relative phase and power errors in a given slot compared to those measured at last SRS transmitted

|  |  |  |
| --- | --- | --- |
| Difference of relative phase error | Difference of relative power error | Time window |
| 40 degrees | 4 dB | 20 msec |

The above requirements when all the following conditions are met within the specified time window:

- UE is not signaled with a change in number of SRS ports in SRS-config, or a change in PUSCH-config

- UE remains in DRX active time (UE does not enter DRX OFF time)

- No measurement gap occurs

- No instance of SRS transmission with the usage antenna switching occurs

- Active BWP remains the same

- EN-DC and CA configuration is not changed for the UE (UE is not configured or de-configured with PSCell or SCell(s))

- When UE is not configured with uplink switching with parameter *uplinkTxSwitching-r16*; or when UE is configured with uplink switching with parameter *uplinkTxSwitching-r16*, and the capability *uplinkTxSwitching*-*PUSCH-TransCoherence* is absent or indicated as ‘fullCoherent’; or when UE is configured with uplink switching with parameter *uplinkTxSwitching-r16*, the capability *uplinkTxSwitching*-*PUSCH-TransCoherence* is indicated as ‘nonCoherent’,and uplink switching is not triggered by the switching mechanisms specified in sub-clause 6.1.6 of TS 38.214 [10] between last transmitted SRS and scheduled transmission.

## ***<Next change>***

## 6.5 Output RF spectrum emissions

### 6.5.1 Occupied bandwidth

Occupied bandwidth is defined as the bandwidth containing 99 % of the total integrated mean power of the transmitted spectrum on the assigned channel. The occupied bandwidth for all transmission bandwidth configurations (Resources Blocks) shall be less than the channel bandwidth specified in Table 6.5.1-1. For UE power class 1.5 the occupied bandwidth requirements apply to the sum of the power from both UE antenna connectors.

Table 6.5.1-1: Occupied channel bandwidth

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | NR channel bandwidth | | | | | | | | | | | | |
|  | 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 |
| **Occupied channel bandwidth (MHz)** | 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

### 6.5.2 Out of band emission

#### 6.5.2.1 General

The Out of band emissions are unwanted emissions immediately outside the assigned channel bandwidth resulting from the modulation process and non-linearity in the transmitter but excluding spurious emissions. This out of band emission limit is specified in terms of a spectrum emission mask and an adjacent channel leakage power ratio. For UE power class 1.5 the out-of-band emission limits apply to the sum of the power of the out-of-band emission from both UE antenna connectors.

To improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

*< text omitted >*

### 6.5.3 Spurious emissions

Spurious emissions are emissions which are caused by unwanted transmitter effects such as harmonics emission, parasitic emissions, intermodulation products and frequency conversion products, but exclude out of band emissions unless otherwise stated. The spurious emission limits are specified in terms of general requirements in line with SM.329 [9] and NR operating band requirement to address UE co-existence. For UE power class 1.5 the spurious emission limits apply to the sum of the power of the spurious emission from both UE antenna connectors.

To improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

#### 6.5.3.1 General spurious emissions

## ***<Next change>***

#### 6.5.3.2 Spurious emissions for UE co-existence

This clause specifies the requirements for NR bands for coexistence with protected bands.

Table 6.5.3.2-1: Requirements for spurious emissions for UE co-existence

| NR Band | Spurious emission for UE co-existence | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Protected band | Frequency range (MHz) | | | Maximum Level (dBm) | MBW (MHz) | NOTE |
| n1, n84 | E-UTRA Band 1, 5, 7, 8, 11, 18, 19, 20, 21, 22, 26, 27, 28, 31, 32, 38, 40, 41, 42, 43, 44, 45, 50, 51, 52, 65, 67, 68, 69, 72, 73, 74, 75, 76,  NR Band n78, n79 | FDL\_low | - | FDL\_high | -50 | 1 |  |
|  | NR Band n77 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
|  | E-UTRA Band 3, | FDL\_low | - | FDL\_high | -50 | 1 | 15 |
|  | E-UTRA Band 34 | FDL\_low | - | FDL\_high | -50 | 1 | 15, XX |
|  | Frequency range | 1880 | - | 1895 | -40 | 1 | 15, 27 |
|  | Frequency range | 1895 | - | 1915 | -15.5 | 5 | 15, 26, 27 |
|  | Frequency range | 1915 | - | 1920 | +1.6 | 5 | 15, 26, 27 |
| n2 | E-UTRA Band 4, 5, 12, 13, 14, 17, 24, 26, 27, 28, 29, 30, 41, 42, 48, 50, 51, 53, 66, 70, 71, 74, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
|  | E-UTRA Band 2, 25 | FDL\_low | - | FDL\_high | -50 | 1 | 15 |
|  | E-UTRA Band 43,  NR Band n77 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| n3, n80 | E-UTRA Band 1, 5, 7, 8, 20, 26, 27, 28, 31, 32, 33, 34, 38, 39, 40, 41, 43, 44, 45, 50, 51, 65, 67, 68, 69, 72, 73,74, 75, 76.  NR Band n79 | FDL\_low | - | FDL\_high | -50 | 1 |  |
|  | E-UTRA Band 3 | FDL\_low | - | FDL\_high | -50 | 1 | 15 |
|  | E-UTRA Band 11, 18, 19, 21 | FDL\_low | - | FDL\_high | -50 | 1 |  |
|  | E-UTRA Band 22, 42, 52,  NR Band n77, n78 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
|  | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8 |
| n5, n89 | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 12, 13, 14, 17, 18, 19, 24, 25, 26, 28, 29, 30, 31, 34, 38, 40, 42, 43, 45, 48, 50, 51, 65, 66, 70, 71, 73, 74, 85  NR Band n79 | FDL\_low | - | FDL\_high | -50 | 1 |  |
|  | E-UTRA Band 41, 52, 53  NR Band n77, n78 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
|  | E-UTRA Band 11, 21 | FDL\_low | - | FDL\_high | -50 | 1 |  |
|  | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8 |
| n7 | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 12, 13, 14, 17, 20, 22, 26, 27, 28, 29, 30, 31, 32, 33, 34, 40, 42, 43, 50, 51, 52, 65, 66, 67, 68, 72, 74, 75, 76, 85,  NR Band n77, n78 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| NR Band n79 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
|  | Frequency range | 2570 | - | 2575 | +1.6 | 5 | 15, 21, 26 |
|  | Frequency range | 2575 | - | 2595 | -15.5 | 5 | 15, 21, 26 |
|  | Frequency range | 2595 | - | 2620 | -40 | 1 | 15, 21 |
| n8, n81 | E-UTRA Band 1, 20, 28, 31, 32, 33, 34, 38, 39, 40, 45, 50, 51, 65, 67, 68, 69, 72, 73, 74, 75, 76 | FDL\_low | - | FDL\_high | -50 | 1 |  |
|  | E-UTRA band 3, 7, 22, 41, 42, 43, 52,  NR Band n77, n78, n79 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
|  | E-UTRA 8 | FDL\_low | - | FDL\_high | -50 | 1 | 15 |
|  | E-UTRA Band 11, 21 | FDL\_low | - | FDL\_high | -50 | 1 |  |
|  | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8 |
| n12 | E-UTRA Band 2, 5, 13, 14, 17, 24, 25, 26, 27, 30, 41, 50, 53, 70, 71, 74 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 4, 48, 51, 66  NR Band n77 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA Band 12, 85 | FDL\_low | - | FDL\_high | -50 | 1 | 15 |
| n14 | E-UTRA Band 2, 4, 5, 12, 13, 14, 17, 23, 24, 25, 26, 27, 29, 30, 41, 48, 53, 66, 70, 71, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
|  | NR Band n77 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
|  | Frequency range | 769 | - | 775 | -35 | 0.00625 | 12, 15 |
|  | Frequency range | 799 | - | 805 | -35 | 0.00625 | 11, 12, 15 |
| n18 | E-UTRA Band 1, 3, 11, 21, 34, 40, 42, 65  NR Band n79 | FDL\_low | - | FDL\_high | -50 | 1 |  |
|  | NR Band n77, n78 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
|  | Frequency range | 758 | - | 799 | -50 | 1 |  |
|  | Frequency range | 799 | - | 803 | -40 | 1 |  |
|  | Frequency range | 860 | - | 890 | -40 | 1 |  |
|  | Frequency range | 945 | - | 960 | -50 | 1 |  |
|  | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8 |
|  | Frequency range | 2545 | - | 2575 | -50 | 1 |  |
|  | Frequency range | 2595 | - | 2645 | -50 | 1 |  |
| n20, n82 | E-UTRA Band 1, 3, 7, 8, 22, 31, 32, 33, 34, 40, 43, 50, 51, 65, 67, 68, 72, 74, 75, 76 | FDL\_low | - | FDL\_high | -50 | 1 |  |
|  | E-UTRA Band 20 | FDL\_low | - | FDL\_high | -50 | 1 | 15 |
|  | E-UTRA Band 38, 42, 52, 69,  NR Band n77, n78 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
|  | Frequency range | 758 | - | 788 | -50 | 1 |  |
| n25 | E-UTRA Band 4, 5, 12, 13, 14, 17, 24, 26, 27, 28, 29, 30, 41, 42, 48, 53, 66, 70, 71, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
|  | E-UTRA Band 2 | FDL\_low | - | FDL\_high | -50 | 1 | 15 |
|  | E-UTRA Band 25 | FDL\_low | - | FDL\_high | -50 | 1 | 15 |
|  | E-UTRA Band 43,  NR Band n77 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| n26 | E-UTRA Band 1, 2, 3, 4, 5, 11, 12, 13, 14, 17, 18,19, 21, 24, 25, 26, 29, 30, 31, 34, 39, 40, 42, 43, 48, 50, 51, 65, 66, 70, 71, 73,74, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
|  | E-UTRA Band 41, 53  NR Band n77, n78, n79 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
|  | Frequency range | 703 | - | 799 | -50 | 1 |  |
|  | Frequency range | 799 | - | 803 | -40 | 1 | 15 |
|  | Frequency range | 945 | - | 960 | -50 | 1 |  |
|  | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8 |
| n28, n83 | E-UTRA Band 1, 4, 22, 32, 42, 43, 50, 51, 65, 66, 74, 75, 76,  NR Band n77, n78 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
|  | E-UTRA Band 1 | FDL\_low | - | FDL\_high | -50 | 1 | 19, 25 |
|  | E-UTRA Band 2, 3, 5, 7, 8, 18, 19, 20, 25, 26, 27, 31, 34, 38, 39, 40, 41, 52, 72, 73  NR Band n79 | FDL\_low | - | FDL\_high | -50 | 1 |  |
|  | E-UTRA Band 11, 21 | FDL\_low | - | FDL\_high | -50 | 1 | 19, 24 |
|  | Frequency range | 470 | - | 694 | -42 | 8 | 15, 35 |
|  | Frequency range | 470 | - | 710 | -26.2 | 6 | 34 |
|  | Frequency range | 662 | - | 694 | -26.2 | 6 | 15 |
|  | Frequency range | 758 | - | 773 | -32 | 1 | 15 |
|  | Frequency range | 773 | - | 803 | -50 | 1 |  |
|  | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8, 19 |
| n30 | E-UTRA Band 2, 4, 5, 7, 12, 13, 14, 17, 24, 25, 26, 27, 29, 30, 38, 41, 48, 53, 66, 70, 71, 85,  NR Band n77 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| n34 | E-UTRA Band 1, 3, 7, 8, 11, 18, 19, 20, 21, 22, 26, 28, 31, 32, 33, 38,39, 40, 41, 42, 43, 44, 45, 50, 51, 52, 65, 67, 69, 72, 74, 75, 76,  NR Band n78, n79 | FDL\_low | - | FDL\_high | -50 | 1 | 5 |
|  | NR Band n77 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
|  | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8 |
| n38 | E-UTRA Band 1, 2, 3, 4, 5, 8, 12, 13, 14, 17, 20, 22, 27, 28, 29, 30, 31, 32, 33, 34, 40, 42, 43, 50, 51, 52, 65, 66, 67, 68, 72, 74, 75, 76, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
|  | NR Band n77, n78, n79 | FDL\_low | - | FDL\_high | -50 | 1 |  |
|  | Frequency range | 2620 | - | 2645 | -15.5 | 5 | 15, 22, 26 |
|  | Frequency range | 2645 | - | 2690 | -40 | 1 | 15, 22 |
| n39 | E-UTRA Band 1, 8, 22, 26, 28, 34, 40, 41, 42, 44, 45, 50, 51, 52, 74,  NR Band n79 | FDL\_low | - | FDL\_high | -50 | 1 |  |
|  | NR Band n77, n78 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
|  | Frequency range | 1805 | - | 1855 | -40 | 1 | 33 |
|  | Frequency range | 1855 | - | 1880 | -15.5 | 5 | 15, 26, 33 |
| n40 | E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 20, 21, 22, 26, 27, 28, 31, 32, 33, 34, 38, 39, 41, 42, 43, 44, 45, 50, 51, 52, 65, 67, 68, 69, 72, 74, 75, 76,  NR Band n77, n78 | FDL\_low | - | FDL\_high | -50 | 1 | 44 |
|  | NR Band n79 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
|  | Frequency range | 1884.5 |  | 1915.7 | -41 | 0.3 | 8 |
| n41 | E-UTRA Band 1, 2, 3, 4, 5, 8, 12, 13, 14, 17, 24, 25, 26, 27, 28, 29, 30, 34, 39, 42, 44, 45, 48, 50, 51, 52, 65, 66, 70, 71, 73, 74, 85,  NR Band n77, n78 | FDL\_low | - | FDL\_high | -50 | 1 |  |
|  | E-UTRA Band 40 | FDL\_low | - | FDL\_high | -40 | 1 |  |
|  | NR Band n79 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
|  | E-UTRA Band 11, 18, 19, 21 | FDL\_low | - | FDL\_high | -50 | 1 |  |
|  | Frequency range | 1884.5 |  | 1915.7 | -41 | 0.3 | 8 |
| n47 | E-UTRA Band 1, 3, 5, 7, 8, 22, 26, 28, 34, 39, 40, 41, 42, 44, 45, 65, 68, 72, 73 | FDL\_low | - | FDL\_high | -50 | 1 |  |
|  | NR Band n71, n77, n78, n79 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| n48 | E-UTRA Band 2, 4, 5, 12, 13, 14, 17, 24, 25, 26, 29, 30, 41, 50, 51, 66, 70, 71, 74, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| n50 | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 12, 13, 17, 20, 26, 28, 29, 31, 34, 38, 39, 40, 41, 42, 43, 48, 65, 66, 67, 68 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| n51 | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 12, 13, 17, 20, 26, 28, 29, 31, 34, 38, 39, 40, 41, 42, 43, 48, 52, 65, 66, 67, 68, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| n53 | E-UTRA Band 2, 4, 5, 12, 13, 14, 17, 24, 25, 26, 29, 30, 48, 66, 70, 71, 85,  NR Band n77 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| n65 | E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 20, 21, 22, 26, 27, 28, 31, 32, 38, 40, 41, 42, 43, 50, 51, 65, 68, 69, 72, 74, 75, 76,  NR Band n78, n79 | FDL\_low | - | FDL\_high | -50 | 1 |  |
|  | NR Band n77 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
|  | E-UTRA Band 34 | FDL\_low | - | FDL\_high | -50 | 1 | 43 |
|  | Frequency range | 1900 | - | 1915 | -15.5 | 5 | 15, 26, 27 |
|  | Frequency range | 1915 | - | 1920 | +1.6 | 5 | 15, 26, 27 |
| n66, n86 | E-UTRA Band 2, 4, 5, 7, 12, 13, 14, 17, 25, 26, 27, 28, 29, 30, 38, 41, 43, 50, 51, 53, 66, 70, 71, 74, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
|  | E-UTRA Band 42, 48,  NR Band n77 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| n70 | E-UTRA Band 2, 4, 5, 12, 13, 14, 17, 24, 25, 26, 29, 30, 41, 48, 66, 70, 71, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
|  | NR Band n47, n77 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| n71 | E-UTRA Band 4, 5, 12, 13, 14, 17, 24, 26, 30, 48, 53, 66, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
|  | E-UTRA Band 2, 25, 41, 70,  NR Band n77 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
|  | E-UTRA Band 29 | FDL\_low | - | FDL\_high | -38 | 1 | 15 |
|  | E-UTRA Band 71 | FDL\_low | - | FDL\_high | -50 | 1 | 15 |
| n74 | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 12, 13, 17, 18, 19, 20, 26, 28, 29, 31, 34, 38, 39, 40, 41, 42, 43, 48, 52, 65, 66, 67, 68, 85  NR Band n77, n78 | FDL\_low | - | FDL\_high | -50 | 1 |  |
|  | NR Band n79 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
|  | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8 |
|  | Frequency range | 1400 | - | 1427 | -32 | 27 | 15, 41 |
|  | Frequency range | 1475 | - | 1488 | -28 | 1 | 15, 42 |
|  | Frequency range | 1475 | - | 1488 | -50 | 1 | 15, 45 |
|  | Frequency range | 1475.9 | - | 1510.9 | -35 | 1 | 15, 46 |
|  | Frequency range | 1488 | - | 1518 | -50 | 1 | 15 |
| n77 | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 11, 12, 13, 14, 17, 18, 19, 20, 21, 24, 25, 26, 27, 28, 29, 30, 34, 39, 40, 41, 53, 65, 66, 70, 71, 74, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
|  | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8 |
| n78 | E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 20, 21, 26, 28, 32, 34, 39, 40, 41, 65, 75, 76 | FDL\_low | - | FDL\_high | -50 | 1 |  |
|  | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8 |
| n79 | E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 21, 28, 34, 39, 40, 41, 42, 65, 74 | FDL\_low | - | FDL\_high | -50 | 1 |  |
|  | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8 |
| n95 | E-UTRA Band 1, 3 , 5, 8, 28, 39, 40, 41,  NR Band n78, n79 | FDL\_low | - | FDL\_high | -50 | 1 | 5 |
|  | NR Band n77 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
|  | Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8 |
| NOTE 1: FDL\_low and FDL\_high refer to each frequency band specified in Table 5.2-1 in TS 38.101-1 or Table 5.5-1 in TS 36.101  NOTE 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.5.3.1-2 are permitted for each assigned NR carrier used in the measurement due to 2nd, 3rd, 4th or 5th harmonic spurious emissions. Due to spreading of the harmonic emission the exception is also allowed for the first 1 MHz frequency range immediately outside the harmonic emission on both sides of the harmonic emission. This results in an overall exception interval centred at the harmonic emission of (2 MHz + N x LCRB x RBsize kHz), where N is 2, 3, 4, 5 for the 2nd, 3rd, 4th or 5th harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval.  NOTE 3: 15 kHz SCS is assumed when RB is mentioned in the note when channel bandwidth is less than or equal to 50 MHz, lowest SCS is assumed when channel bandwidth is larger than 50 MHz. The transmission bandwidth in terms of RB position and range is not limited to 15 kHz SCS and shall scale with SCS accordingly.  NOTE 4: Void  NOTE 5: For non-synchronised TDD operation to meet these requirements some restriction will be needed for either the operating band or protected band  NOTE 6: N/A  NOTE 7: Void  NOTE 8: Applicable when co-existence with PHS system operating in 1884.5 - 1915.7 MHz.  NOTE 9: Void  NOTE 10: Void  NOTE 11: Void  NOTE 12: The emissions measurement shall be sufficiently power averaged to ensure a standard deviation < 0.5 dB  NOTE 13: Void  NOTE 14: Void  NOTE 15: These requirements also apply for the frequency ranges that are less than FOOB (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.  NOTE 16: Void  NOTE 17: Void  NOTE 18: Void  NOTE 19: Applicable when the assigned NR carrier is confined within 718 MHz and 748 MHz and when the channel bandwidth used is 5 or 10 MHz.  NOTE 20: Void  NOTE 21: This requirement is applicable for any channel bandwidths up to 20MHz within the range 2500 - 2570 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2560.5 - 2562.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2552 - 2560 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.  NOTE 22: This requirement is applicable for power class 3 UE for any channel bandwidths up to 20 MHz. For channel bandwidth within the range 2570 - 2615 MHz with the following restriction: for carriers of 15 MHz bandwidth when the carrier centre frequency is within the range 2605.5 - 2607.5 MHz and for carriers of 20 MHz bandwidth when the carrier centre frequency is within the range 2597 - 2605 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB. . For carriers overlapping the frequency range 2615 - 2620 MHz the requirement applies with the maximum output power configured to +19 dBm in the IE P-Max.  NOTE 23: Void  NOTE 24: As exceptions, measurements with a level up to the applicable requirement of -38 dBm/MHz is permitted for each assigned NR carrier used in the measurement due to 2nd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.3.1-1) for which the 2nd harmonic totally or partially overlaps the measurement bandwidth (MBW).  NOTE 25: As exceptions, measurements with a level up to the applicable requirement of -36 dBm/MHz is permitted for each assigned NR carrier used in the measurement due to 3rd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.3.1-1) for which the 3rd harmonic totally or partially overlaps the measurement bandwidth (MBW).  NOTE 26: For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band.  NOTE 27: This requirement is applicable for channel bandwidths up to 20 MHz within the range 1920 - 1980 MHz with the following restriction: for carriers of 15 MHz bandwidth when the carrier centre frequency is within the range 1927.5 - 1929.5 MHz and for carriers of 20 MHz bandwidth when the carrier centre frequency is within the range 1930 - 1938 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.  NOTE 28: Void  NOTE 29: Void  NOTE 30: Void  NOTE 31: Void  NOTE 32: Void  NOTE 33: This requirement is only applicable for carriers with bandwidth up to 20MHz and confined within 1885-1920 MHz (requirement for carriers with at least 1RB confined within 1880 - 1885 MHz is not specified). This requirement applies for an uplink transmission bandwidth less than or equal to 54 RB for carriers of 15 MHz bandwidth when carrier center frequency is within the range 1892.5 - 1894.5 MHz and for carriers of 20 MHz bandwidth when carrier center frequency is within the range 1895 - 1903 MHz.  NOTE 34: This requirement is applicable for 5 and 10 MHz NR channel bandwidth allocated within 718-728 MHz. For carriers of 10 MHz bandwidth, this requirement applies for an uplink transmission bandwidth less than or equal to 30 RB with RBstart > 1 and RBstart < 48.  NOTE 35: This requirement is applicable in the case of a 10 MHz NR carrier confined within 703 MHz and 733 MHz, otherwise the requirement of -25 dBm with a measurement bandwidth of 8 MHz applies.  NOTE 36: Void  NOTE 37: Void  NOTE 38: Void  NOTE 39: Void  NOTE 40: Void  NOTE 41: Applicable for cases and when the lower edge of the assigned NR UL channel bandwidth frequency is greater than or equal to 1427 MHz + the channel BW assigned for 5 and 10 MHz bandwidth, and when the lower edge of the assigned NR UL channel bandwidth frequency is greater than or equal to 1440 MHz for 15 and 20 MHz bandwidth. This requirement shall be verified with UE transmission power of 15 dBm.  NOTE 42: Applicable when upper edge of the assigned NR UL channel bandwidth frequency is more than 1460MHz and less than or equal to 1470MHz for 5 MHz bandwidth, and when the upper edge of the assigned NR UL channel bandwidth frequency is more than 1460MHz and less than or equal to 1465 MHz for 10 MHz bandwidth.  NOTE 43: This requirement is applicable for NR channel bandwidth allocated within 1920-1980 MHz.  NOTE 44: As exceptions, for 90 and 100 MHz channel bandwidth, -40 dBm/MHz is applicable in the frequency range of 2496 – 2505 MHz.  NOTE 45: Applicable when upper edge of the assigned NR UL channel bandwidth frequency is equal to or less than 1460MHz.  NOTE 46: Applicable for 5MHz bandwidth and when the NR carrier is within 1447.9 – 1462.9 MHz. | | | | | | | |

NOTE: To simplify Table 6.5.3.2-1, E-UTRA band numbers are listed for bands which are specified only for E-UTRA operation or both E-UTRA and NR operation. NR band numbers are listed for bands which are specified only for NR operation.

## ***<Next change>***

### 6.5.4 Transmit intermodulation

The transmit intermodulation performance is a measure of the capability of the transmitter to inhibit the generation of signals in its non linear elements caused by presence of the wanted signal and an interfering signal reaching the transmitter via the antenna.

UE transmit intermodulation is defined by the ratio of the mean power of the wanted signal to the mean power of the intermodulation product when an interfering CW signal is added at a level below the wanted signal at each transmitter antenna port with the other antenna port(s) if any terminated. Both the wanted signal power and the intermodulation product power are measured through NR rectangular filter with measurement bandwidth shown in Table 6.5.4-1. For UE power class 1.5 the transmit intermodulation requirement is specified at each antenna connector with the wanted signal measured as the sum of the output power from both UE antenna connectors.

The requirement of transmit intermodulation is specified in Table 6.5.4-1.

Table 6.5.4-1: Transmit Intermodulation

|  |  |  |
| --- | --- | --- |
| Wanted signal  channel bandwidth | BWChannel | |
| Interference signal  frequency offset from channel center | BWChannel | 2\*BWChannel |
| Interference CW signal level | -40 dBc | |
| Intermodulation product | < -29 dBc | < -35 dBc |
| Measurement bandwidth | The maximum transmission bandwidth configuration among the different SCS's for the channel BW as defined in Table 6.5.2.4.1-1 | |
| Measurement offset from channel center | BWChannel and 2\*BWChannel | 2\*BWChannel and 4\*BWChannel |

## ***<Next change>***

## 6.5A Output RF spectrum emissions for CA

### 6.5A.2 Out of band emission for CA

#### 6.5A.2.2 Spectrum emission mask

##### 6.5A.2.2.1 Spectrum emission mask for intra-band contiguous CA

### 6.5A.3 Spurious emission for CA

#### 6.5A.3.3 Additional spurious emissions for CA

6.5A.3.3.1.2 Requirement for network signalling value "CA\_ NS\_27"

When "CA\_NS 27" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5A.3.3.1.2-1. This requirement also applies for the frequency ranges that are less than FOOB (MHz) in Table 6.5A.3.1-1 from the edge of the aggregated channel bandwidth.

Table 6.5A.3.3.1.2-1: Additional requirements for "CA\_ NS\_27"

|  |  |  |
| --- | --- | --- |
| Frequency range  (MHz) | Spectrum emission limit (dBm) for aggregated channel bandwidth of  max 40 MHz | Measurement bandwidth |
| 9 kHz – 3530 MHz | -40 | 1 MHz |
| 3530 MHz – 3540 MHz | -25 |  |
| 3710 MHz – 3720 MHz | -25 |  |
| 3720 MHz – 12.75 GHz | -40 |  |

6.5A.3.3.1.3 Requirement for network signalling value "CA\_ NS\_46"

When "CA\_NS 46" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5A.3.3.1.3-1. This requirement also applies for the frequency ranges that are less than FOOB (MHz) in Table 6.5A.3.1-1 from the edge of the aggregated channel bandwidth.

## ***<Next change>***

##### 6.5A.3.3.2 Additional spurious emissions for intra-band non-contiguous CA

6.5A.3.3.2.1 Requirement for network signalling value "CA\_NC\_ NS\_04"

For intra-band non-cotiguous CA\_n41(2A), the spurious emission requirements in subclause 6.5.3.3.1 (indicated by NS\_04) applies in each uplink CC.

## ***<Next change>***

#### 7.3A.2.3 Reference sensitivity power level for Inter-band CA

For inter-band carrier aggregation with one component carrier per operating band and the uplink assigned to one NR band the throughput shall be ≥ 95 % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2.2, 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 7.3A.3.2. The reference sensitivity is defined to be met with all downlink component carriers active and one of the uplink carriers active. Exceptions to reference sensitivity are allowed in accordance with clause 7.3A.4, 7.3A.5 and 7.3A.6.

For the combination of intra-band and inter-band carrier aggregation, the intra-band CA relaxation, ΔRIBC and ΔRIBNC, are also applied according to the clause 7.3A.2.1 and 7.3A.2.2.

#### 7.3A.2.4 Void

## ***<Next change>***

###### 7.3B.2.3.5.2 MSD test points for intermodulation interference due to dual uplink operation for EN-DC in NR FR1 involving three bands

Table 7.3B.2.3.5.2-0: MSD test points for Pcell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| NR or E-UTRA Band / Channel bandwidth / NRB / MSD | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| EN-DC Configuration | EUTRA/NR band | UL Fc  (MHz) | UL/DL BW  (MHz) | UL  LCRB | DL Fc (MHz) | MSD  (dB) | IMD order |
| DC\_66A-(n)71AA | 66 | 1750 | 5 | 25 | 2150 | 5 | IMD4 |
|  | n71 | 678 | 10 | 10 (RBstart =0) | 632 | N/A | N/A |
| NOTE 1: For NR band, UL/DL BW and UL LCRB can be adjusted according to the supported BW and lowest SCS supported by the UE.  NOTE 2: E-UTRA carrier shall be set to min(+20 dBm, PCMAX\_L\_E-UTRA,c) and NR carrier shall be set to min(+20 dBm, PCMAX\_L,f,c,NR) as defined in clause 6.2B.4.1.3 | | | | | | | |

Table 7.3B.2.3.5.2-1: MSD test points for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| NR or E-UTRA Band / Channel bandwidth / NRB / MSD | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| EN-DC Configuration | EUTRA / NR band | UL Fc  (MHz) | UL/DL BW  (MHz) | UL  LCRB | DL Fc (MHz) | MSD  (dB) | IMD order |
| DC\_1A-3A\_n28A  DC\_1A-3C\_n28A | 1 | 1975 | 5 | 25 | 2165 | N/A | N/A |
|  | n28 | 710.5 | 5 | 25 | 765.5 | N/A | N/A |
|  | 3 | 1723.5 | 5 | 25 | 1818.5 | 4.0 | IMD5 |
| DC\_1A\_n3A-n28A | 1 | 1975 | 5 | 25 | 2165 | N/A | N/A |
|  | n28 | 710.5 | 5 | 25 | 765.5 | N/A | N/A |
|  | n3 | 1723.5 | 5 | 25 | 1818.5 | 4.0 | IMD5 |
| DC\_1A-3A\_n28A  DC\_1A-3C\_n28A | 3 | 1780 | 5 | 25 | 1875 | N/A | N/A |
|  | n28 | 710.5 | 5 | 25 | 765.5 | N/A | N/A |
|  | 1 | 1949 | 5 | 25 | 2139 | 11.0 | IMD4 |
| DC\_1A-3A\_n71A  DC\_1A-3A\_n71B | 1 | 1960 | 5 | 25 | 2150 | 5 | IMD4 |
|  | 3 | 1750 | 5 | 25 | 1845 | N/A | N/A |
|  | n71 | 675 | 5 | 25 | 629 | N/A | N/A |
| DC\_1A-7A\_n28A  DC\_1A-7C\_n28A | 1 | 1935 | 5 | 25 | 2125 | N/A | N/A |
|  | n28 | 718 | 5 | 25 | 773 | N/A | N/A |
|  | 7 | 2533 | 10 | 50 | 2653 | 30.0 | IMD2 |
| DC\_1A-7A\_n40A | 1 | 1970 | 5 | 25 | 2160 | N/A | N/A |
|  | 7 | 2510 | 5 | 25 | 2630 | 23 | IMD3 |
|  | n40 | 2390 | 5 | 25 | 2390 | N/A | N/A |
|  | 1 | 1930 | 5 | 25 | 2120 | 16.4 | IMD3 |
|  | 7 | 2530 | 5 | 25 | 2650 | N/A | N/A |
|  | n40 | 2310 | 5 | 25 | 2310 | N/A | N/A |
| DC\_1A-8A\_n78A |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  | 1 | 1940 | 5 | 25 | 2130 | N/A | N/A |
|  | 8 | 895 | 5 | 25 | 940 | 3.3 | IMD5 |
|  | n78 | 3380 | 10 | 50 | 3380 | N/A | N/A |
| DC\_1A-3A\_n77A | 1 | 1950 | 5 | 25 | 2140 | N/A | N/A |
|  | 3 | 1712.5 | 5 | 25 | 1807.5 | 31.5 | IMD2 |
|  | n77 | 3757.5 | 10 | 50 | 3757.5 | N/A | N/A |
|  | 1 | 1950 | 5 | 25 | 2140 | N/A | N/A |
|  | 3 | 1775 | 5 | 25 | 1870 | 8.5 | IMD4 |
|  | n77 | 3980 | 10 | 50 | 3980 | N/A | N/A |
|  | 1 | 1950 | 5 | 25 | 2140 | 31.0 | IMD2 |
|  | 3 | 1775 | 5 | 25 | 1870 | N/A | N/A |
|  | n77 | 3915 | 10 | 50 | 3915 | N/A | N/A |
| DC\_1A-3A\_n78A  DC\_1A-3C\_n78A  DC\_1A-3A\_n78(2A)  DC\_1A-3C\_n78(2A) | 1 | 1950 | 5 | 25 | 2140 | N/A | N/A |
|  | 3 | 1712.5 | 5 | 25 | 1807.5 | 31.2 | IMD2 |
|  | n78 | 3757.5 | 10 | 50 | 3757.5 | N/A | N/A |
|  | 1 | 1935 | 5 | 25 | 2125 | 2.8 | IMD5 |
|  | 3 | 1775 | 5 | 25 | 1870 | N/A | N/A |
|  | n78 | 3725 | 10 | 50 | 3725 | N/A | N/A |
| DC\_1A\_n3A-n78A | 1 | 1950 | 5 | 25 | 2140 | N/A | N/A |
|  | n3 | 1750 | 5 | 25 | 1845 | N/A | N/A |
|  | n78 | 3700 | 10 | 50 | 3700 | 28.4 | IMD2 |
|  | 1 | 1950 | 5 | 25 | 2140 | N/A | N/A |
|  | n3 | 1735 | 5 | 25 | 1830 | 27.9 | IMD2 |
|  | n78 | 3780 | 10 | 50 | 3780 | N/A | N/A |
| DC\_1A-5A\_n78A | 1 | 1932 | 5 | 25 | 2122 | 18.1 | IMD3 |
|  | 5 | 829 | 5 | 25 | 874 | N/A | N/A |
|  | n78 | 3780 | 10 | 50 | 3780 | N/A | N/A |
|  | 1 | 1975 | 5 | 25 | 2165 | N/A | N/A |
|  | 5 | 840 | 5 | 25 | 885 | 3.1 | IMD5 |
|  | n78 | 3405 | 10 | 50 | 3405 | N/A | N/A |
| DC\_1A-7A\_n78A  DC\_1A-7C\_n78A  DC\_1A-7A\_n78(2A)  DC\_1A-7C\_n78(2A) | 1 | 1977.5 | 5 | 25 | 2167.5 | N/A | N/A |
|  | 7 | 2507.5 | 5 | 25 | 2627.5 | 9.1 | IMD4 |
|  | n78 | 3305 | 10 | 50 | 3305 | N/A | N/A |
|  | 1 | 1950 | 5 | 25 | 2140 | 8.7 | IMD4 |
|  | 7 | 2510 | 10 | 50 | 2630 | N/A | N/A |
|  | n78 | 3580 | 10 | 50 | 3580 | N/A | N/A |
| DC\_1A\_n7A-n78A  DC\_1A\_n7B-n78A | 1 | 1977.5 | 5 | 25 | 2167.5 | N/A | N/A |
|  | n7 | 2507.5 | 5 | 25 | 2627.5 | 9.1 | IMD4 |
|  | n78 | 3305 | 10 | 50 | 3305 | N/A | N/A |
|  | 1 | 1970 | 5 | 25 | 2160 | N/A | N/A |
|  | n7 | 2520 | 5 | 25 | 2640 | N/A | N/A |
|  | n78 | 3390 | 10 | 50 | 3390 | 10.1 | IMD4 |
| DC\_1A-3A\_n79A | 1 | 1950 | 5 | 25 | 2140 | 3.6 | IMD5 |
|  | 3 | 1750 | 5 | 25 | 1845 | N/A | N/A |
|  | n79 | 4860 | 40 | 216 | 4860 | N/A | N/A |
| DC\_1A-5A\_n79A | 1 | 1950 | 5 | 25 | 2140 | N/A | N/A |
|  | 5 | 837.5 | 5 | 25 | 882.5 | 18.3 | IMD3 |
|  | n79 | 4782.5 | 40 | 216 | 4782.5 | N/A | N/A |
|  | 1 | 1930 | 5 | 25 | 2120 | N/A | N/A |
|  | 5 | 837.5 | 5 | 25 | 882.5 | 8.9 | IMD4 |
|  | n79 | 4907.5 | 40 | 216 | 4907.5 | N/A | N/A |
|  | 1 | 1950 | 5 | 25 | 2140 | 8.1 | IMD4 |
|  | 5 | 837.5 | 5 | 25 | 882.5 | N/A | N/A |
|  | n79 | 4652.5 | 40 | 216 | 4652.5 | N/A | N/A |
| DC\_1A-8A\_n28A | 1 | 1970 | 5 | 25 | 2160 | N/A | N/A |
|  | n28 | 730 | 5 | 25 | 785 | N/A | N/A |
|  | 8 | 905 | 5 | 25 | 950 | 3.3 | IMD5 |
| DC\_1A\_n8A-n40A | 1 | 1930 | 5 | 25 | 2120 | N/A | N/A |
|  | n8 | 885 | 5 | 25 | 930 | 8.0 | IMD4 |
|  | n40 | 2395 | 5 | 25 | 2395 | N/A | N/A |
| DC\_1A-8A\_n77A | 1 | 1955 | 5 | 25 | 2145 | N/A | N/A |
|  | n77 | 3410 | 10 | 50 | 3410 | N/A | N/A |
|  | 8 | 910 | 5 | 25 | 955 | 3.3 | IMD5 |
| DC\_1A-8A\_n77A | 8 | 910 | 5 | 25 | 955 | N/A | N/A |
|  | n77 | 3960 | 10 | 50 | 3960 | N/A | N/A |
|  | 1 | 1950 | 5 | 25 | 2140 | 14.4 | IMD3 |
| DC\_1A\_n8A-n78A | 1 | 1945 | 5 | 25 | 2135 | N/A | N/A |
|  | n8 | 900 | 5 | 25 | 945 | N/A | N/A |
|  | n78 | 3745 | 10 | 50 | 3745 | 14.9 | IMD3 |
|  | 1 | 1940 | 5 | 25 | 2130 | N/A | N/A |
|  | n8 | 895 | 5 | 25 | 940 | 3.3 | IMD5 |
|  | n78 | 3380 | 10 | 50 | 3380 | N/A | N/A |
| DC\_1A-8A\_n79A | 1 | 1935 | 5 | 25 | 2125 | N/A | N/A |
|  | n79 | 4815 | 40 | 216 | 4815 | N/A | N/A |
|  | 8 | 900 | 5 | 25 | 945 | 15.8 | IMD3 |
| DC\_1A-8A\_n79A | 8 | 900 | 5 | 25 | 945 | N/A | N/A |
|  | n79 | 4845 | 40 | 216 | 4845 | N/A | N/A |
|  | 1 | 1955 | 5 | 25 | 2145 | 8.2 | IMD4 |
| DC\_1A-11A\_n3A | 1 | 1960 | 5 | 25 | 2150 | N/A | N/A |
|  | n3 | 1720 | 5 | 25 | 1815 | N/A | N/A |
|  | 11 | 1432 | 5 | 25 | 1480 | 15.2 | IMD3 |
| DC\_1A-11A\_n77A | 1 | 1955 | 5 | 25 | 2145 | N/A | N/A |
|  | n77 | 3441 | 10 | 50 | 3441 | N/A | N/A |
|  | 11 | 1438 | 5 | 25 | 1486 | 31.4 | IMD2 |
| DC\_1A-11A\_n77A | 11 | 1438 | 5 | 25 | 1486 | N/A | N/A |
|  | n77 | 3578 | 10 | 50 | 3578 | N/A | N/A |
|  | 1 | 1950 | 5 | 25 | 2140 | 30.8 | IMD2 |
| DC\_1A-11A\_n78A | 1 | 1955 | 5 | 25 | 2145 | N/A | N/A |
|  | n78 | 3441 | 10 | 50 | 3441 | N/A | N/A |
|  | 11 | 1438 | 5 | 25 | 1486 | 31.4 | IMD2 |
| DC\_1A-11A\_n78A | 11 | 1438 | 5 | 25 | 1486 | N/A | N/A |
|  | n78 | 3578 | 10 | 50 | 3578 | N/A | N/A |
|  | 1 | 1950 | 5 | 25 | 2140 | 30.8 | IMD2 |
| DC\_1A-18A\_n77A | 1 | N/A | N/A | N/A | N/A | N/A | N/A |
|  | 18 | N/A | N/A | N/A | N/A | N/A | IMD5 |
|  | n77 | N/A | N/A | N/A | N/A | N/A | N/A |
|  | 1 | 1930 | 5 | 25 | 2120 | 16.4 | IMD3 |
|  | 18 | 825 | 5 | 25 | 870 | N/A | N/A |
|  | n77 | 3770 | 10 | 50 | 3770 | N/A | N/A |
| DC\_1A-18A\_n78A | 1 | N/A | N/A | N/A | N/A | N/A | N/A |
|  | 18 | N/A | N/A | N/A | N/A | N/A | IMD5 |
|  | n78 | N/A | N/A | N/A | N/A | N/A | N/A |
|  | 1 | 1930 | 5 | 25 | 2120 | 16.4 | IMD3 |
|  | 18 | 819 | 5 | 25 | 864 | N/A | N/A |
|  | n78 | 3758 | 10 | 50 | 3758 | N/A | N/A |
| DC\_1A-18A\_n79A | 1 | 1935 | 5 | 25 | 2125 | N/A | N/A |
|  | 18 | 822.5 | 5 | 25 | 867.5 | 18.3 | IMD3 |
|  | n79 | 4737.5 | 40 | 216 | 4737.5 | N/A | N/A |
|  | 1 | 1930 | 5 | 25 | 2120 | N/A | N/A |
|  | 18 | 820 | 5 | 25 | 865 | 8.9 | IMD4 |
|  | n79 | 4925 | 40 | 216 | 4925 | N/A | N/A |
|  | 1 | 1935 | 5 | 25 | 2125 | 8.1 | IMD4 |
|  | 18 | 822.5 | 5 | 25 | 867.5 | N/A | N/A |
|  | n79 | 4592.5 | 40 | 216 | 4592.5 | N/A | N/A |
| DC\_1A-19A\_n77A  DC\_1A-19A\_n78A | 1 | 1940 | 5 | 25 | 2130 | 17.8 | IMD3 |
|  | 19 | 832.5 | 5 | 25 | 877.5 | N/A | N/A |
|  | n77, n78 | 3795 | 10 | 50 | 3795 | N/A | N/A |
|  | 1 | N/A | N/A | N/A | N/A | N/A | IMD5 |
|  | 19 | N/A | N/A | N/A | N/A | N/A | N/A |
|  | n78 | N/A | N/A | N/A | N/A | N/A | IMD5 |
| DC\_1A-20A\_n8A | 1 | 1925 | 5 | 25 | 2115 | N/A | N/A |
|  | n8 | 910 | 5 | 25 | 955 | N/A | N/A |
|  | 20 | 846 | 5 | 25 | 805 | 11.5 | IMD4 |
| DC\_1A-20A\_n38A | 1 | N/A | N/A | N/A | N/A | N/A | N/A |
|  | 20 | N/A | N/A | N/A | N/A | N/A | IMD5 |
|  | n38 | N/A | N/A | N/A | N/A | N/A | N/A |
| DC\_1A-28A\_n3A | 28 | 710.5 | 5 | 25 | 765.5 | N/A | N/A |
|  | n3 | 1780 | 5 | 25 | 1875 | N/A | N/A |
|  | 1 | 1949 | 5 | 25 | 2139 | 11.0 | IMD4 |
| DC\_1A-28A\_n7A  DC\_1A-1A-28A\_n7A  DC\_1A-28A\_n7B  DC\_1A-1A-28A\_n7B | 1 | 1935 | 5 | 25 | 2125 | N/A | N/A |
|  | 28 | 730 | 10 | 50 | 785 | 4.5 | IMD5 |
|  | n7 | 2510 | 10 | 50 | 2630 | N/A | N/A |
| DC\_1A-19A\_n79A | 1 | 1950 | 5 | 25 | 2140 | N/A | N/A |
|  | 19 | 837.5 | 5 | 25 | 882.5 | 18.3 | IMD3 |
|  | n79 | 4782.5 | 40 | 216 | 4782.5 | N/A | N/A |
|  | 1 | 1950 | 5 | 25 | 2140 | 8.1 | IMD4 |
|  | 19 | 837.5 | 5 | 25 | 882.5 | N/A | N/A |
|  | n79 | 4652.5 | 40 | 216 | 4652.5 | N/A | N/A |
| DC\_1A-20A\_n78A | 1 | 1930 | 5 | 25 | 2120 | 20.3 | IMD3 |
|  | 20 | 835 | 5 | 25 | 794 | N/A | N/A |
|  | n78 | 3790 | 10 | 50 | 3790 | N/A | N/A |
| DC\_1A-20A\_n78A | 1 | 1950 | 5 | 25 | 2140 | N/A | N/A |
|  | 20 | 851 | 5 | 25 | 810 | 3.0 | IMD5 |
|  | n78 | 3330 | 10 | 50 | 3330 | N/A | N/A |
| DC\_1A-21A\_n77A  DC\_1A-21A\_n78A | 1 | 1964.6 | 5 | 25 | 2154.6 | 30.6 | IMD2 |
|  | 21 | 1450.4 | 5 | 25 | 1498.4 | N/A | N/A |
|  | n77, n78 | 3605 | 10 | 50 | 3605 | N/A | N/A |
|  | 1 | N/A | N/A | N/A | N/A | N/A | N/A |
|  | 21 | N/A | N/A | N/A | N/A | N/A | IMD2 |
|  | n78 | N/A | N/A | N/A | N/A | N/A | N/A |
|  | 1 | 1950 | 5 | 25 | 2140 | N/A | N/A |
|  | 21 | 1452 | 5 | 25 | 1500 | 2.9 | IMD5 |
|  | n77, n78 | 3675 | 10 | 50 | 3675 | N/A | N/A |
| DC\_1A-21A\_n79A | 1 | N/A | N/A | N/A | N/A | N/A | N/A |
|  | 21 | N/A | N/A | N/A | N/A | N/A | IMD4 |
|  | n79 | N/A | N/A | N/A | N/A | N/A | N/A |
| DC\_1A\_n28A-n40A | 1 | 1930 | 5 | 25 | 2120 | N/A | N/A |
|  | n28 | 743 | 5 | 25 | 798 | N/A | N/A |
|  | n40 | 2374 | 5 | 25 | 2374 | 10.1 | IMD4 |
|  | 1 | 1930 | 5 | 25 | 2120 | N/A | N/A |
|  | n28 | 713 | 5 | 25 | 768 | 8.6 | IMD4 |
|  | n40 | 2314 | 5 | 25 | 2314 | N/A | N/A |
| DC\_1A-28A\_n40A | 1 | 1950 | 5 | 25 | 2140 | N/A | N/A |
|  | 28 | 725 | 5 | 25 | 780 | 8.9 | IMD4 |
|  | n40 | 2340 | 5 | 25 | 2340 | N/A | N/A |
| DC\_1A-28A\_n77A | 1 | 1960 | 5 | 25 | 2150 | 15.8 | IMD3 |
|  | 28 | 740 | 5 | 25 | 795 | N/A | N/A |
|  | n77 | 3630 | 10 | 50 | 3630 | N/A | N/A |
| DC\_1A-28A\_n77A | 1 | 1960 | 5 | 25 | 2150 | N/A | N/A |
|  | 28 | 725 | 5 | 25 | 780 | 4.3 | IMD5 |
|  | n77 | 3330 | 10 | 50 | 3330 | N/A | N/A |
| DC\_1A-28A\_n77A DC\_1A-28A\_n78A | 1 | 1960 | 5 | 25 | 2150 | 15.7 | IMD3 |
|  | 28 | 740 | 5 | 25 | 795 | N/A | N/A |
|  | n77/n78 | 3630 | 10 | 50 | 3630 | N/A | N/A |
| DC\_1A-28A\_n77A DC\_1A-28A\_n78A | 1 | 1970 | 5 | 25 | 2160 | N/A | N/A |
|  | 28 | 739 | 5 | 25 | 794 | 4.2 | IMD5 |
|  | n77/n78 | 3352 | 10 | 50 | 3352 | N/A | N/A |
| DC\_1A\_n28A-n78A | 1 | 1950 | 5 | 25 | 2140 | N/A | N/A |
|  | n28 | 733 | 5 | 25 | 788 | N/A | N/A |
|  | n78 | 3416 | 10 | 50 | 3416 | 15.7 | IMD3 |
|  | 1 | 1950 | 5 | 25 | 2140 | N/A | N/A |
|  | n78 | 3320 | 10 | 50 | 3320 | N/A | N/A |
|  | n28 | 735 | 5 | 25 | 790 | 3.3 | IMD5 |
| DC\_1A-28A\_n79A | 1 | 1930 | 5 | 25 | 2120 | N/A | N/A |
|  | 28 | 733 | 5 | 25 | 788 | 15.2 | IMD3 |
|  | n79 | 4648 | 40 | 216 | 4648 | N/A | N/A |
|  | 1 | 1925 | 5 | 25 | 2115 | N/A | N/A |
|  | 28 | 740 | 5 | 25 | 795 | 10.0 | IMD4 |
|  | n79 | 4980 | 40 | 216 | 4980 | N/A | N/A |
|  | 1 | 1977.5 | 5 | 25 | 2167.5 | 1.2 | IMD4 |
|  | 28 | 745.5 | 5 | 25 | 800.5 | N/A | N/A |
|  | n79 | 4420 | 40 | 216 | 4420 | N/A | N/A |
|  | 1 | 1935 | 5 | 25 | 2125 | 4.5 | IMD5 |
|  | 28 | 718 | 5 | 25 | 773 | N/A | N/A |
|  | n79 | 4807 | 40 | 216 | 4807 | N/A | N/A |
| DC\_1A-32A\_n78A  DC\_1A-32A\_n78(2A) | 1 | 1930 | 5 | 25 | 2120 | N/A | N/A |
|  | 32 | N/A | 5 | 25 | 1470 | 31.8 | IMD2 |
|  | n78 | 3400 | 10 | 50 | 3400 | N/A | N/A |
|  | 1 | 1930 | 5 | 25 | 2120 | N/A | N/A |
|  | 32 | N/A | 5 | 25 | 1470 | 0 | IMD5 |
|  | n78 | 3630 | 10 | 50 | 3630 | N/A | N/A |
| DC\_1A\_n40A-n78A  DC\_1A\_n40A-n78(2A) | 1 | 1930 | 5 | 25 | 2120 | N/A | N/A |
|  | n40 | 2340 | 5 | 25 | 2340 | N/A | N/A |
|  | n78 | 3450 | 10 | 50 | 3450 | 9.8 | IMD4 |
|  | 1 | 1960 | 5 | 25 | 2150 | N/A | N/A |
|  | n40 | 2360 | 5 | 25 | 2360 | 10.6 | IMD4 |
|  | n78 | 3520 | 10 | 50 | 3520 | N/A | N/A |
| DC\_1A-41A\_n3A  DC\_1A-41C\_n3A | 1 | 1977.5 | 5 | 25 | 2167.5 | N/A | N/A |
|  | n3 | 1712.5 | 5 | 25 | 1807.5 | N/A | N/A |
|  | 41 | 2507.5 | 5 | 25 | 2507.5 | 5.0 | IMD5 |
| DC\_1A-41A\_n28A | 1 | 1935 | 5 | 25 | 2125 | N/A | N/A |
|  | n28 | 718 | 5 | 25 | 773 | N/A | N/A |
|  | 41 | 2653 | 10 | 50 | 2653 | 30 | IMD2 |
| DC\_1A-41A\_n77A  DC\_1A-41C\_n77A  DC\_1A-41A\_n77(2A)  DC\_1A-41C\_n77(2A) | 1 | 1970 | 5 | 25 | 2160 | N/A | N/A |
|  | n77 | 3400 | 10 | 50 | 3400 | N/A |  |
|  | 41 | 2510 | 5 | 25 | 2510 | N/A | IMD4 |
|  | 1 | 1950 | 5 | 25 | 2140 | 9.3 | IMD4 |
|  | n77 | 3710 | 10 | 50 | 3710 | N/A | N/A |
|  | 41 | 2640 | 5 | 25 | 2640 | N/A | N/A |
|  | 1 | 1930 | 5 | 25 | 2120 | 11.0 | N/A |
|  | n77 | 4150 | 10 | 50 | 4150 | N/A |  |
|  | 41 | 2510 | 5 | 25 | 2510 | N/A | IMD5 |
| DC\_1A-41A\_n78A  DC\_1A-41C\_n78A  DC\_1A-41A\_n78(2A)  DC\_1A-41C\_n78(2A) | 1 | 1950 | 5 | 25 | 2140 | 9.3 | IMD4 |
|  | 41 | 2640 | 5 | 25 | 2640 | N/A | N/A |
|  | n78 | 3710 | 10 | 50 | 3710 | N/A | N/A |
|  | 1 | 1975 | 5 | 25 | 2165 | N/A | N/A |
|  | 41 | 2515 | 5 | 25 | 2515 | 12 | IMD4 |
|  | n78 | 3410 | 10 | 50 | 3410 | N/A | N/A |
| DC\_1A-41A\_n78A | 1 | 1955 | 5 | 25 | 2145 | 8.7 | IMD4 |
|  | 41 | 2507.5 | 10 | 50 | 2507.5 | N/A | N/A |
|  | n78 | 3580 | 10 | 50 | 3580 | N/A | N/A |
| DC\_1A\_n41A-n78A | 1 | 1975 | 5 | 25 | 2165 | N/A | N/A |
|  | n41 | 2515 | 10 | 50 | 2515 | 11.5 | IMD4 |
|  | n78 | 3410 | 10 | 50 | 3410 | N/A | N/A |
|  | 1 | 1970 | 5 | 25 | 2160 | N/A | N/A |
|  | n41 | 2650 | 10 | 25 | 2650 | N/A | N/A |
|  | n78 | 3330 | 10 | 50 | 3330 | 19.6 | IMD3 |
| DC\_1A-41A\_n79A | 1 | 1970 | 5 | 25 | 2160 | N/A | N/A |
|  | n79 | 4500 | 40 | 216 | 4500 | N/A |  |
|  | 41 | 2530 | 5 | 25 | 2530 | 29.4 | IMD2 |
| DC\_1A\_n75A-n78A  DC\_1A\_n75A-n78(2A) | 1 | 1930 | 5 | 25 | 2120 | N/A | N/A |
|  | n78 | 3400 | 10 | 50 | 3400 | N/A | N/A |
|  | n75 | - | - | - | 1470 | 30.4 | IMD2 |
| DC\_1A-42A\_n28A | 1 | 1950 | 5 | 25 | 2140 | N/A | N/A |
|  | n28 | 733 | 5 | 25 | 788 | N/A | N/A |
|  | 42 | 3416 | 5 | 25 | 3416 | 15.7 | IMD3 |
| DC\_1A-42A\_n28A | 42 | 3580 | 5 | 25 | 3580 | N/A | N/A |
|  | n28 | 723 | 5 | 25 | 778 | N/A | N/A |
|  | 1 | 1944 | 5 | 25 | 2134 | 15.7 | IMD3 |
| DC\_1A-42A\_n79A | 1 | 1977.5 | 5 | 25 | 2167.5 | N/A | N/A |
|  | n79 | 4420 | 40 | 216 | 4420 | N/A | N/A |
|  | 42 | 3490 | 5 | 25 | 3490 | 4.8 | IMD5 |
|  | 42 | 3402.5 | 5 | 25 | 3402.5 | N/A | N/A |
|  | n79 | 4640 | 40 | 216 | 4640 | N/A | N/A |
|  | 1 | 1975 | 5 | 25 | 2165 | 15.5 | IMD3 |
|  | 42 | 3450 | 5 | 25 | 3450 | N/A | N/A |
|  | n79 | 4520 | 40 | 216 | 4520 | N/A | N/A |
|  | 1 | 1950 | 5 | 25 | 2140 | 9.3 | IMD4 |
| DC\_1A\_SUL\_n77A-n80A | 1 | 1950 | 5 | 25 | 2140 | 23 | IMD3 |
|  | n80 | 1760 | 5 | 25 |  | N/A | N/A |
| DC\_1A\_SUL\_n77A-n80A | 1 | 1922.5 | 5 | 25 | 2112.5 | N/A | N/A |
|  | n80 | 1782.5 | 5 | 25 |  | N/A | N/A |
|  | n78 | 3425 | 10 | 50 | 3425 | 13.0 | IMD4 |
| DC\_1A\_n78A-n79A | 1 | 1950 | 5 | 25 | 2140 | N/A | N/A |
|  | n78 | 3410 | 10 | 50 | 3410 | N/A | N/A |
|  | n79 | 4870 | 40 | 216 | 4870 | 15.9 | IMD3 |
|  | 1 | 1950 | 5 | 25 | 2140 | N/A | N/A |
|  | n79 | 4670 | 40 | 216 | 4670 | N/A | N/A |
|  | n78 | 3490 | 10 | 50 | 3490 | 4.6 | IMD5 |
| DC\_1A\_SUL\_n78A-n80A | 1 | 1950 | 5 | 25 | 2140 | 23 | IMD3 |
|  | n80 | 1760 | 5 | 25 |  | N/A | N/A |
|  | 1 | 1922.5 | 5 | 25 | 2112.5 | N/A | N/A |
|  | n80 | 1782.5 | 5 | 25 |  | N/A | N/A |
|  | n78 | 3425 | 10 | 50 | 3425 | 13.0 | IMD4 |
| DC\_2A-4A\_n41A | 2 | 1860 | 5 | 25 | 1940 | 11.0 | IMD4 |
|  | 4 | 1715 | 5 | 25 | 2115 | N/A | N/A |
|  | n41 | 2685 | 10 | 50 | 2685 | N/A | N/A |
| DC\_2A-5A\_n71A | 2 | 1855 | 5 | 25 | 1935 | N/A | N/A |
|  | n71 | 686.5 | 5 | 25 | 640.5 | N/A | N/A |
|  | 5 | 846.5 | 5 | 25 | 891.5 | 4.2 | IMD5 |
| DC\_2A-7A\_n78A  DC\_2A-7C\_n78A  DC\_2A-7A-7A\_n78A  DC\_2A-7A\_n78(2A)  DC\_2A-7C\_n78(2A)  DC\_2A-7A-7A\_n78(2A) | 2 | 1870 | 5 | 25 | 1950 | 8.6 | IMD4 |
|  | 7 | 2550 | 5 | 25 | 2685 | N/A | N/A |
|  | n78 | 3525 | 10 | 50 | 3475 | N/A | N/A |
| DC\_2A\_n7A-n78A,  DC\_2A\_n7(2A)-n78A  DC\_2A\_n7A-n78(2A)  DC\_2A\_n7(2A)-n78(2A) | 2 | 1900 | 5 | 25 | 1980 | N/A | N/A |
|  | n7 | 2525 | 5 | 25 | 2645 | N/A | N/A |
|  | n78 | 3775 | 10 | 50 | 3775 | 4.2 | IMD5 |
| DC\_2A\_12A-n66A | 2 | N/A | N/A | N/A | N/A | N/A | IMD4 |
|  | 12 | N/A | N/A | N/A | N/A | N/A | N/A |
|  | n66 | N/A | N/A | N/A | N/A | N/A | N/A |
| DC\_2A-13A\_n66A  DC\_2A-2A-13A\_n66A | 2 | 1860 | 5 | 25 | 1940 | 6.2 | IMD4 |
|  | 13 | 780 | 10 | 50 | 749 | N/A | N/A |
|  | n66 | 1750 | 5 | 25 | 2150 | N/A | N/A |
| DC\_2A\_n38A-n78A | 2 | 1870 | 5 | 25 | 1950 | N/A | N/A |
|  | n38 | 2610 | 5 | 25 | 2610 | N/A | N/A |
|  | n78 | 3350 | 10 | 50 | 3350 | 14.8 | IMD3 |
| DC\_2A-14A\_n66A | 2 | 1874 | 5 | 25 | 1954 | 7.2 | IMD4 |
|  | 14 | 793 | 5 | 25 | 763 | N/A | N/A |
|  | 66 | 1770 | 5 | 25 | 2170 | N/A | N/A |
| DC\_2A\_n41A-n71A | 2 | 1900 | 5 | 25 | 1980 | N/A | N/A |
|  | n41 | 2530 | 10 | 50 | 2530 | N/A | N/A |
|  | n71 | 676 | 5 | 50 | 630 | 28.7 | IMD2 |
|  | 2 | 1900 | 5 | 25 | 1980 | N/A | N/A |
|  | n41 | 2586 | 10 | 50 | 2586 | 29.2 | IMD2 |
|  | n71 | 686 | 5 | 50 | 640 | N/A | N/A |
| DC\_2A-46A\_n66A5  DC\_2A-46C\_n66A5  DC\_2A-46D\_n66A5 | 2 | N/A | N/A | N/A | N/A | N/A | N/A |
|  | 46 | N/A | N/A | N/A | N/A | N/A | IMD3,  IMD5 |
|  | n66 | N/A | N/A | N/A | N/A | N/A | N/A |
| DC\_2A-48A\_n66A | 2 | 1880 | 5 | 25 | 1960 | N/A | N/A |
|  | 48 | 3620 | 10 | 50 | 3620 | 29.4 | IMD2 |
|  | n66 | 1740 | 5 | 25 | 2140 | N/A | N/A |
|  | 2 | 1880 | 5 | 25 | 1960 | 28.3 | IMD2 |
|  | 48 | 3695 | 5 | 25 | 3695 | N/A | N/A |
|  | n66 | 1735 | 5 | 25 | 2135 | N/A | N/A |
| DC\_2A-66A\_n2A | 2 | 1900 | 5 | 25 | 1980 | 20 | IMD3 |
| 66 | 1730 | 5 | 25 | 2130 | N/A | N/A |
| n2 | 1855 | 5 | 25 | 1935 | N/A | N/A |
| DC\_2A-66A\_n5A | 2 | 1900 | 5 | 25 | 1980 | N/A | N/A |
|  | 66 | 1740 | 5 | 25 | 2140 | 7.2 | IMD4 |
|  | n5 | 830 | 5 | 25 | 875 | N/A | N/A |
| DC\_2A-66A\_n25A | 2 | 1855 | 5 | 25 | 1935 | 20 | IMD3 |
|  | 66 | 1775 | 5 | 25 | 2175 | N/A | N/A |
|  | n25 | 1855 | 5 | 25 | 1935 | 20 | IMD3 |
|  | 2 | 1883.3 | 5 | 25 | 1963.3 | N/A | N/A |
|  | 66 | 1750 | 5 | 25 | 2150 | 4 | IMD5 |
|  | n25 | 1883.3 | 5 | 25 | 1963.3 | N/A | N/A |
|  | 2 | 1883.3 | 5 | 25 | 1963.3 | N/A | N/A |
|  | 66 | 1712.5 | 5 | 25 | 2112.5 | 23 | IMD3 |
|  | n25 | 1912.5 | 5 | 25 | 1992.5 | N/A | N/A |
| DC\_2A-66A\_n41A  DC\_2A-66A\_n41C  DC\_2A-66A\_n41(2A) | 2 | 1860 | 5 | 25 | 1940 | 11.0 | IMD4 |
|  | 66 | 1715 | 5 | 25 | 2115 | N/A | N/A |
|  | n41 | 2685 | 5 | 25 | 2685 | N/A | N/A |
| DC\_2A-66A\_n48A  DC\_2A-66A\_n48B  DC\_2A-66A-66A\_n48A  DC\_2A-66A-66A\_n48B | 2 | 1905 | 5 | 25 | 1985 | N/A | N/A |
|  | 66 | 1755 | 5 | 25 | 2155 | 12.1 | IMD4 |
|  | n48 | 3560 | 5 | 25 | 3560 | N/A | N/A |
| DC\_2A-66A\_n48A  DC\_2A-66A\_n48B  DC\_2A-66A-66A\_n48A  DC\_2A-66A-66A\_n48B | 2 | 1880 | 5 | 25 | 1960 | 28.3 | IMD5 |
|  | 66 | 1735 | 5 | 25 | 2135 | N/A | N/A |
|  | n48 | 3695 | 5 | 25 | 3695 | N/A | N/A |
| DC\_2A-66A\_n78A  DC\_2A-66A\_n78(2A)  DC\_2A-66A-66A\_n78A  DC\_2A-66A-66A\_n78(2A)  DC\_2A\_n66A-n78A | 2 | 1880 | 5 | 25 | 1960 | N/A | N/A |
|  | 66/n66 | 1760 | 5 | 25 | 2160 | 10.3 | IMD4 |
|  | n78 | 3480 | 10 | 50 | 3480 | N/A | N/A |
| DC\_2A-66A\_n78A  DC\_2A-66A\_n78(2A)  DC\_2A-66A-66A\_n78A  DC\_2A-66A-66A\_n78(2A) | 2 | 1880 | 5 | 25 | 1960 | 32.1 | IMD2 |
|  | 66 | 1740 | 5 | 25 | 2140 | N/A | N/A |
|  | n78 | 3700 | 10 | 50 | 3700 | N/A | N/A |
| DC\_2A-66A\_n78A  DC\_2A-66A\_n78(2A)  DC\_2A-66A-66A\_n78A  DC\_2A-66A-66A\_n78(2A) | 2 | 1880 | 5 | 25 | 1960 | 9.1 | IMD4 |
|  | 66 | 1770 | 5 | 25 | 2170 | N/A | N/A |
|  | n78 | 3350 | 10 | 50 | 3350 | N/A | N/A |
| DC\_2A-66A\_n78A  DC\_2A-66A\_n78(2A)  DC\_2A-66A-66A\_n78A  DC\_2A-66A-66A\_n78(2A) | 2 | 1880 | 5 | 25 | 1960 | 2.1 | IMD5 |
|  | 66 | 1760 | 5 | 25 | 2160 | N/A | N/A |
|  | n78 | 3620 | 10 | 50 | 3620 | N/A | N/A |
| DC\_2A\_n66A-n78A | 2 | 1880 | 5 | 25 | 1960 | N/A | N/A |
|  | n66 | 1740 | 5 | 25 | 2140 | N/A | N/A |
|  | n78 | 3620 | 10 | 50 | 3620 | 29.4 | IMD2 |
|  | 2 | 1880 | 5 | 25 | 1960 | N/A | N/A |
|  | n66 | 1740 | 5 | 25 | 2140 | N/A | N/A |
|  | n78 | 3340 | 10 | 50 | 3340 | 8.9 | IMD4 |
| DC\_2A-71A\_n38A DC\_2A-2A-71A\_n38A | 2 | 1862 | 5 | 25 | 1942 | 26 | IMD2 |
|  | 71 | 668 | 5 | 25 | 622 | N/A | N/A |
|  | n38 | 2610 | 10 | 50 | 2610 | N/A | N/A |
| DC\_2A-71A\_n78A DC\_2A-2A-71A\_n78A | 2 | 1874 | 5 | 25 | 1954 | 16.5 | IMD3 |
|  | 71 | 693 | 5 | 25 | 647 | N/A | N/A |
|  | n78 | 3340 | 10 | 50 | 3340 | N/A | N/A |
| DC\_3A\_n1A-n28A  DC\_3C\_n1A-n28A | 3 | 1780 | 5 | 25 | 1875 | N/A | N/A |
|  | n28 | 710.5 | 5 | 25 | 765.5 | N/A | N/A |
|  | n1 | 1949 | 5 | 25 | 2139 | 11.0 | IMD4 |
| DC\_3A\_n1A-n40A | n1 | 1950 | 5 | 25 | 2140 | N/A | N/A |
|  | 3 | 1735 | 5 | 25 | 1830 | N/A | N/A |
|  | 40 | 2380 | 5 | 25 | 2380 | 8.0 | IMD5 |
| DC\_3A\_n1A-n77A | 3 | 1750 | 5 | 25 | 1845 | N/A | N/A |
|  | n1 | 1950 | 5 | 25 | 2140 | N/A | N/A |
|  | n77 | 3700 | 10 | 50 | 3700 | 28.4 | IMD2 |
|  | 3 | 1775 | 5 | 25 | 1870 | N/A | N/A |
|  | n1 | 1950 | 5 | 25 | 2140 | 31.0 | IMD2 |
|  | n77 | 3915 | 10 | 50 | 3915 | N/A | N/A |
| DC\_3A\_n1A-n78A  DC\_3C\_n1A-n78A | 3 | 1750 | 5 | 25 | 1845 | N/A | N/A |
|  | n1 | 1950 | 5 | 25 | 2140 | N/A | N/A |
|  | n78 | 3700 | 10 | 50 | 3700 | 28.4 | IMD2 |
|  | 3 | 1770 | 5 | 25 | 1865 | N/A | N/A |
|  | n1 | 1940 | 5 | 25 | 2130 | 3.5 | IMD5 |
|  | n78 | 3720 | 10 | 50 | 3720 | N/A | N/A |
| DC\_3A-5A\_n78A | 3 | N/A | N/A | N/A | N/A | N/A | IMD3 |
|  | 5 | N/A | N/A | N/A | N/A | N/A | N/A |
|  | n78 | N/A | N/A | N/A | N/A | N/A | N/A |
| DC\_3A-5A\_n79A | 3 | 1775 | 5 | 25 | 1870 | N/A | N/A |
|  | 5 | 840 | 5 | 25 | 885 | 18.5 | IMD3 |
|  | n79 | 4435 | 40 | 216 | 4435 | N/A | N/A |
|  | 3 | 1782.5 | 5 | 25 | 1877.5 | 0.2 | IMD4 |
|  | 5 | 842.5 | 5 | 25 | 887.5 | N/A | N/A |
|  | n79 | 4420 | 40 | 216 | 4420 | N/A | N/A |
| DC\_3A-7A\_n5A | 3 | 1780 | 10 | 50 | 1875 | N/A | N/A |
|  | 7 | 2505 | 10 | 50 | 2625 | 30.0 | IMD21 |
|  | n5 | 845 | 5 | 25 | 890 | N/A | N/A |
| DC\_3A-7A\_n8A | 3 | 1780 | 5 | 25 | 1875 | N/A | N/A |
|  | n8 | 890 | 5 | 25 | 935 | N/A | N/A |
|  | 7 | 2550 | 10 | 50 | 2670 | 29.0 | IMD2  IMD33 |
| DC\_3A-7A\_n28A  DC\_3A-7C\_n28A  DC\_3C-7A\_n28A  DC\_3C-7C\_n28A | 3 | 1712.5 | 5 | 25 | 1807.5 | N/A | N/A |
|  | n28 | 743 | 5 | 25 | 798 | N/A | N/A |
|  | 7 | 2562 | 10 | 50 | 2682 | 16.9 | IMD3 |
|  | 7 | 2543 | 10 | 50 | 2663 | N/A | N/A |
|  | n28 | 710.5 | 5 | 25 | 765.5 | N/A | N/A |
|  | 3 | 1737.5 | 5 | 25 | 1832.5 | 26.0 | IMD2 |
| DC\_3A-18A\_n77A  DC\_3A-18A\_n78A | 3 | N/A | N/A | N/A | N/A | N/A | IMD3 |
|  | 18 | N/A | N/A | N/A | N/A | N/A | N/A |
|  | n77, n78 | N/A | N/A | N/A | N/A | N/A | N/A |
| DC\_3A-19A\_n78A | 3 | N/A | N/A | N/A | N/A | N/A | IMD3 |
|  | 19 | N/A | N/A | N/A | N/A | N/A | N/A |
|  | n78 | N/A | N/A | N/A | N/A | N/A | N/A |
| DC\_3A\_n7A-n28A | 3 | 1747 | 5 | 25 | 1842 | N/A | N/A |
| DC\_3C\_n7A-n28A | n7 | 2543 | 5 | 25 | 2663 | N/A | N/A |
|  | n28 | 741 | 5 | 25 | 796.0 | 20.0 | IMD2 |
|  | 3 | 1712.5 | 5 | 25 | 1807.5 | N/A | N/A |
|  | n7 | 2562 | 5 | 25 | 2682 | 17.0 | IMD3 |
|  | n28 | 743 | 5 | 25 | 798 | N/A | N/A |
| DC\_3A-7A\_n40A | 3 | 1771.6 | 5 | 25 | 1866.6 | 3.4 | IMD5 |
|  | 7 | 2530 | 5 | 25 | 2650 | N/A | N/A |
|  | n40 | 2310 | 5 | 25 | 2310 | N/A | N/A |
| DC\_3A-7A\_n77A | 3 | 1725 | 5 | 25 | 1820 | 17.6 | IMD3 |
|  | 7 | 2565 | 5 | 25 | 2685 | N/A | N/A |
|  | n77 | 3310 | 10 | 50 | 3310 | N/A | N/A |
| DC\_3A-7A\_n77A | 3 | 1725 | 5 | 25 | 1820 | 8.6 | IMD4 |
|  | 7 | 2565 | 5 | 25 | 2685 | N/A | N/A |
|  | n77 | 3475 | 10 | 50 | 3475 | N/A | N/A |
| DC\_3A-7A\_n77A | 3 | 1715 | 5 | 25 | 1810 | N/A | N/A |
|  | 7 | 2550 | 5 | 25 | 2670 | 5.2 | IMD5 |
|  | n77 | 4190 | 10 | 50 | 4190 | N/A | N/A |
| DC\_3A-7A\_n77A | 3 | 1720 | 5 | 25 | 1815 | N/A | N/A |
|  | 7 | 2520 | 5 | 25 | 2640 | 3.4 | IMD5 |
|  | n77 | 3900 | 10 | 50 | 3900 | N/A | N/A |
| DC\_3A-7A\_n78A  DC\_3C-7A\_n78A DC\_3C-7C\_n78A  DC\_3A-3A-7A\_n78A  DC\_3A-3A-7A-7A\_n78A  DC\_3A-7A\_SUL\_n78A-n80A  DC\_3C-7A\_SUL\_n78A-n80A  DC\_3A-7A\_n78(2A)  DC\_3C-7A\_n78(2A)  DC\_3A-7C\_n78(2A)  DC\_3C-7C\_n78(2A) | 3 | 1725 | 5 | 25 | 1820 | 17.6 | IMD3 |
|  | 7 | 2565 | 5 | 25 | 2685 | N/A | N/A |
|  | n78 | 3310 | 10 | 50 | 3310 | N/A | N/A |
|  | 3 | 1725 | 5 | 25 | 1820 | 8.6 | IMD4 |
|  | 7 | 2565 | 5 | 25 | 2685 | N/A | N/A |
|  | n78 | 3475 | 10 | 50 | 3475 | N/A | N/A |
| DC\_3A-8A\_n77A | 3 | 1715 | 5 | 25 | 1810 | N/A | N/A |
|  | n77 | 4190 | 10 | 50 | 4190 | N/A | N/A |
|  | 8 | 910 | 5 | 25 | 955 | 9.7 | IMD4 |
| DC\_3A-8A\_n77A | 8 | 910 | 5 | 25 | 955 | N/A | N/A |
|  | n77 | 3640 | 10 | 50 | 3640 | N/A | N/A |
|  | 3 | 1725 | 5 | 25 | 1820 | 16.5 | IMD3 |
| DC\_3A-8A\_n78A  DC\_3A-3A-8A\_n78A | 8 | 910 | 5 | 25 | 955 | N/A | N/A |
|  | n78 | 3640 | 10 | 50 | 3640 | N/A | N/A |
|  | 3 | 1725 | 5 | 25 | 1820 | 16.5 | IMD3 |
| DC\_3A\_n8A-n78A | 3 | 1740 | 5 | 25 | 1835 | N/A | N/A |
|  | n8 | 900 | 5 | 25 | 945 | N/A | N/A |
|  | n78 | 3540 | 10 | 50 | 3540 | 16.3 | IMD3 |
| DC\_3A-8A\_n79A | 3 | 1755 | 5 | 25 | 1850 | N/A | N/A |
|  | n79 | 4465 | 40 | 216 | 4465 | N/A | N/A |
|  | 8 | 910 | 5 | 25 | 955 | 15.3 | IMD3 |
| DC\_3A-8A\_n79A | 8 | 910 | 5 | 25 | 955 | N/A | N/A |
|  | n79 | 4580 | 40 | 216 | 4580 | N/A | N/A |
|  | 3 | 1755 | 5 | 25 | 1850 | 8.8 | IMD4 |
| DC\_3A\_n7A-n78A  DC\_3A\_n7B-n78A  DC\_3C\_n7A-n78A  DC\_3C\_n7B-n78A | 3 | 1730 | 5 | 25 | 1825 | N/A | N/A |
| DC\_3A\_n7A-n78(2A) | n7 | 2560 | 5 | 25 | 2680 | N/A | N/A |
| DC\_3C\_n7A-n78(2A) | n78 | 3390 | 10 | 50 | 3390 | 16.1 | IMD3 |
| DC\_3A-19A\_n79A | 3 | 1775 | 5 | 25 | 1870 | N/A | N/A |
|  | 19 | 840 | 5 | 25 | 885 | 18.5 | IMD3 |
|  | n79 | 4435 | 40 | 216 | 4435 | N/A | N/A |
|  | 3 | 1782.5 | 5 | 25 | 1877.5 | 0.2 | IMD4 |
|  | 19 | 842.5 | 5 | 25 | 887.5 | N/A | N/A |
|  | n79 | 4420 | 40 | 216 | 4420 | N/A | N/A |
| DC\_3A-20A\_n7A  DC\_3C-20A\_n7A | 3 | 1737 | 5 | 25 | 1832 | N/A | N/A |
|  | 20 | 847 | 10 | 20 | 806 | 10.5 | IMD2 |
|  | n7 | 2543 | 10 | 50 | 2663 | N/A | N/A |
| DC\_3A-20A\_n8A | 3 | 1720 | 5 | 25 | 1815 | N/A | N/A |
|  | n8 | 910 | 5 | 25 | 955 | N/A | N/A |
|  | 20 | 851 | 5 | 25 | 810 | 27 | IMD2 |
| DC\_3A-20A\_n8A | 3 | 1765 | 5 | 25 | 1860 | 14.5 | IMD4 |
|  | n8 | 900 | 5 | 25 | 945 | N/A | N/A |
|  | 20 | 840 | 5 | 25 | 799 | N/A | N/A |
| DC\_3A-20A\_n28A  DC\_3C-20A\_n28A | 20 | 852 | 5 | 25 | 811 | N/A | N/A |
|  | n28 | 728 | 5 | 25 | 783 | N/A | N/A |
|  | 3 | 1733 | 5 | 25 | 1828 | 9.4 | IMD4 |
| DC\_3A-20A\_n38A | 3 | 1779 | 5 | 25 | 1874 | N/A | N/A |
|  | 20 | 852 | 10 | 20 | 811 | 26.0 | IMD21 |
|  | n38 | 2590 | 10 | 50 | 2590 | N/A | N/A |
| DC\_3A-20A\_n41A  DC\_3C-20A\_n41A | 3 | 1744 | 5 | 25 | 1839 | 26.0 | IMD2 |
|  | n41 | 2680 | 10 | 50 | 2680 | N/A | N/A |
|  | 20 | 841 | 10 | 50 | 800 | N/A | N/A |
| DC\_3A-20A\_n41A  DC\_3C-20A\_n41A | 3 | 1779 | 5 | 25 | 1874 | N/A | N/A |
|  | n41 | 2590 | 10 | 50 | 2590 | N/A | N/A |
|  | 20 | 852 | 10 | 50 | 811 | 26.0 | IMD2 |
| DC\_3A-20A\_n41A  DC\_3C-20A\_n41A | 3 | 1730 | 5 | 25 | 1825 | N/A | N/A |
|  | n41 | 2660 | 10 | 50 | 2660 | N/A | N/A |
|  | 20 | 841 | 5 | 25 | 800 | 12.5 | IMD3 |
| DC\_3A\_20A\_SUL\_n78A-n80A  DC\_3C\_20A\_SUL\_n78A-n80A | 3 | 1725 | 5 | 25 | 1820 | 17.3 | IMD3 |
|  | 20 | 845 | 5 | 25 | 804 | N/A | N/A |
|  | n78 | 3510 | 10 | 50 | 3510 | N/A | N/A |
| DC\_3A\_n20A-n78A | 3 | 1730 | 5 | 25 | 1825 | N/A | N/A |
|  | n20 | 845 | 5 | 25 | 804 | N/A | N/A |
|  | n78 | 3420 | 10 | 50 | 3420 | 16.1 | IMD3 |
| DC\_3A-20A\_n78A  DC\_3C-20A\_n78A | 3 | 1725 | 5 | 25 | 1820 | 17.3 | IMD3 |
|  | 20 | 845 | 5 | 25 | 804 | N/A | N/A |
|  | n78 | 3510 | 10 | 50 | 3510 | N/A | N/A |
| DC\_3A-21A\_n77A  DC\_3A-21A\_n78A | 3 | 1767.5 | 5 | 25 | 1862.5 | N/A | N/A |
|  | 21 | 1459.5 | 5 | 25 | 1507.5 | 8.8 | IMD4 |
|  | n77, n78 | 3795 | 10 | 50 | 3795 | N/A | N/A |
|  | 3 | N/A | N/A | N/A | N/A | N/A | IMD2 |
|  | 21 | N/A | N/A | N/A | N/A | N/A | N/A |
|  | n78 | N/A | N/A | N/A | N/A | N/A | N/A |
| DC\_3A-21A\_n77A | 3 | 1771.6 | 5 | 25 | 1866.6 | 3.4 | IMD5 |
|  | 21 | 1450.4 | 5 | 25 | 1498.4 | N/A | N/A |
|  | n77 | 3935 | 10 | 50 | 3935 | N/A | N/A |
| DC\_3A-21A\_n79A | 3 | N/A | N/A | N/A | N/A | N/A | N/A |
|  | 21 | N/A | N/A | N/A | N/A | N/A | IMD3 |
|  | n79 | N/A | N/A | N/A | N/A | N/A | N/A |
|  | 3 | 1774.2 | 5 | 25 | 1869.2 | 17.8 | IMD3 |
|  | 21 | 1450.4 | 5 | 25 | 1498.4 | N/A | N/A |
|  | n79 | 4770 | 40 | 216 | 4770 | N/A | N/A |
| DC\_3A-28A\_n5A  DC\_3C-28A\_n5A | 3 | 1735 | 5 | 25 | 1830 | 8.7 | IMD4 |
|  | 28 | 705 | 5 | 25 | 798 | N/A | N/A |
|  | n5 | 845 | 5 | 25 | 874 | N/A | N/A |
|  | 3 | 1750 | 5 | 25 | 1845 | N/A | N/A |
|  | 28 | 730 | 5 | 25 | 785 | 9.4 | IMD4 |
|  | n5 | 845 | 5 | 25 | 874 | N/A | N/A |
| DC\_3A-28A\_n7A  DC\_3C-28A\_n7A  DC\_3A-3A-28A\_n7A  DC\_3A-28A\_n7B  DC\_3C-28A\_n7B  DC\_3A-3A-28A\_n7B | 3 | 1737.5 | 5 | 25 | 1832.5 | 26.0 | IMD2 |
|  | 28 | 710.5 | 5 | 25 | 765.5 | N/A | N/A |
|  | n7 | 2543 | 10 | 50 | 2663 | N/A | N/A |
|  | 3 | 1747 | 5 | 25 | 1842 | N/A | N/A |
|  | 28 | 741 | 5 | 25 | 796.0 | 20.0 | IMD2 |
|  | n7 | 2543 | 5 | 25 | 2663 | N/A | N/A |
| DC\_3A-28A\_n77A | 3 | 1712.5 | 5 | 25 | 1807.5 | N/A | N/A |
|  | 28 | 715 | 5 | 25 | 770 | 15.3 | IMD3 |
|  | n77 | 4195 | 10 | 50 | 4195 | N/A | N/A |
|  | 3 | 1755 | 5 | 25 | 1850 | 17.0 | IMD3 |
|  | 28 | 735 | 5 | 25 | 790 | N/A | N/A |
|  | n77 | 3320 | 10 | 50 | 3320 | N/A | N/A |
| DC\_3A\_n28A-n77A | 3 | 1720 | 5 | 25 | 1815 | N/A | N/A |
|  | 28 | 733 | 5 | 25 | 788 | N/A | N/A |
|  | n77 | 4173 | 10 | 50 | 4173 | 15.9 | IMD3 |
|  | 3 | 1712.5 | 5 | 25 | 1807.5 | N/A | N/A |
|  | 28 | 715 | 5 | 25 | 770 | 15.3 | IMD3 |
|  | n77 | 4195 | 10 | 50 | 4195 | N/A | N/A |
| DC\_3A-28A\_n41A | 3 | 1720 | 5 | 25 | 1815 | N/A | N/A |
|  | n41 | 2510 | 5 | 25 | 2510 | N/A | N/A |
|  | 28 | 735 | 5 | 25 | 790 | 26.0 | IMD21 |
|  | 3 | 1737.5 | 5 | 25 | 1832.5 | 26.0 | IMD2 |
|  | n41 | 2543 | 10 | 50 | 2543 | N/A | N/A |
|  | 28 | 710.5 | 5 | 25 | 765.5 | N/A | N/A |
| DC\_3A-28A\_n78A  DC\_3C-28A\_n78A  DC\_3A-3A-28A\_n78A | 3 | 1775 | 5 | 25 | 1870 | 17.3 | IMD3 |
|  | 28 | 740 | 5 | 25 | 760 | N/A | N/A |
|  | n78 | 3350 | 10 | 25 | 3350 | N/A | N/A |
| DC\_3A-28A\_n79A | 3 | 1770 | 5 | 25 | 1865 | N/A | N/A |
|  | 28 | 725 | 5 | 25 | 780 | 10.3 | IMD4 |
|  | n79 | 4530 | 40 | 216 | 4530 | N/A | N/A |
|  | 3 | 1775 | 5 | 25 | 1870 | 5.7 | IMD5 |
|  | 28 | 725 | 5 | 25 | 780 | N/A | N/A |
|  | n79 | 4770 | 40 | 216 | 4770 | N/A | N/A |
| DC\_3A\_n28A-n78A  DC\_3C\_n28A-n78A | 3 | 1750 | 5 | 25 | 1845 | N/A | N/A |
|  | n28 | 743 | 5 | 25 | 798 | N/A | N/A |
|  | n78 | 3764 | 10 | 50 | 3764 | 4.5 | IMD5 |
| DC\_3A\_SUL\_n77A-n84A | 3 | 1782.5 | 5 | 25 | 1877.5 | N/A | N/A |
|  | n84 | 1922.5 | 5 | 25 |  | N/A | N/A |
|  | n77 | 3425 | 10 | 50 | 3425 | 13.0 | IMD4 |
| DC\_3A\_n40A-n78A | 3 | 1730 | 5 | 25 | 1825 | N/A | N/A |
|  | n40 | 2360 | 5 | 25 | 2360 | N/A | N/A |
|  | n78 | 3620 | 10 | 50 | 3620 | 4.8 | IMD5 |
|  | 3 | 1720 | 5 | 25 | 1815 | N/A | N/A |
|  | n40 | 2360 | 5 | 25 | 2360 | 4.4 | IMD5 |
|  | n78 | 3760 | 10 | 50 | 3760 | N/A | N/A |
| DC\_3A\_n40A-n79A | 3 | 1720 | 5 | 25 | 1815 | N/A | N/A |
|  | n40 | 2330 | 5 | 25 | 2330 | N/A | N/A |
|  | n79 | 4550 | 40 | 216 | 4550 | 4.7 | IMD5 |
|  | 3 | 1720 | 5 | 25 | 1815 | N/A | N/A |
|  | n40 | 2330 | 5 | 25 | 2330 | 3.2 | IMD5 |
|  | n79 | 4550 | 40 | 216 | 4550 | N/A | N/A |
| DC\_3A\_n41A-n79A | 3 | 1770 | 5 | 25 | 1865 | N/A | N/A |
|  | n41 | 2670 | 10 | 50 | 2670 | N/A | N/A |
|  | n79 | 4440 | 40 | 216 | 4440 | 30.8 | IMD24 |
| DC\_3A\_n75A-n78A  DC\_3A\_n75A-n78(2A) | 3 | 1782.5 | 5 | 25 | 1877.5 | N/A | N/A |
|  | n78 | 3305 | 10 | 50 | 3305 | N/A | N/A |
|  | n75 | - | - | - | 1514.5 | 10.0 | IMD2 |
| DC\_3A\_n78A-n79A | 3 | 1770 | 5 | 25 | 1865 | N/A | N/A |
|  | n78 | 3340 | 10 | 50 | 3340 | N/A | N/A |
|  | n79 | 4910 | 40 | 216 | 4910 | 16.3 | IMD3 |
|  | 3 | 1770 | 5 | 25 | 1865 | N/A | N/A |
|  | n79 | 4510 | 40 | 216 | 4510 | N/A | N/A |
|  | n78 | 3710 | 10 | 50 | 3710 | 4.2 | IMD5 |
| DC\_3A\_SUL\_n78A-n82A | 3 | 1775 | 5 | 25 | 1870 | 4 | IMD4 |
|  | n82 | 840 | 5 | 25 |  | N/A | N/A |
| DC\_3A\_SUL\_n78A-n84A | 3 | 1782.5 | 5 | 25 | 1877.5 | N/A | N/A |
|  | n84 | 1922.5 | 5 | 25 |  | N/A | N/A |
|  | n78 | 3425 | 10 | 50 | 3425 | 13.0 | IMD4 |
| DC\_3A-21A\_n79A | 3 | 1774.2 | 5 | 25 | 1869.2 | 17.8 | IMD3 |
|  | 21 | 1450.4 | 5 | 25 | 1498.4 | N/A | N/A |
|  | n79 | 4770 | 40 | 216 | 4770 | N/A | N/A |
| DC\_3A-32A\_n78A  DC\_3A-32A\_n78(2A) | 3 | 1730 | 5 | 25 | 1825 | N/A | N/A |
|  | 32 | N/A | 5 | 25 | 1470 | 4.9 | IMD4 |
|  | n78 | 3720 | 10 | 50 | 3720 | N/A | N/A |
|  | 3 | 1775 | 5 | 25 | 1870 | N/A | N/A |
|  | 32 | N/A | 5 | 25 | 1475 | 0 | IMD5 |
|  | n78 | 3400 | 10 | 50 | 3400 | N/A | N/A |
| DC\_3A-40A\_n1A | n1 | 1950 | 5 | 25 | 2140 | N/A | N/A |
|  | 3 | 1735 | 5 | 25 | 1830 | N/A | N/A |
|  | 40 | 2380 | 5 | 25 | 2380 | 8.0 | IMD5 |
| DC\_3A-41A\_n28A  DC\_3A-41C\_n28A | 41 | 2543 | 10 | 50 | 2543 | N/A | N/A |
|  | n28 | 710.5 | 5 | 25 | 765.5 | N/A | N/A |
|  | 3 | 1737.5 | 5 | 25 | 1832.5 | 26 | IMD2 |
|  | 3 | 1780 | 5 | 25 | 1875 | N/A | N/A |
|  | n28 | 738 | 5 | 25 | 793 | N/A | N/A |
|  | 41 | 2518 | 5 | 25 | 2518 | 27.4 | IMD2 |
|  | 3 | 1715 | 5 | 25 | 1810 | N/A | N/A |
|  | n28 | 743 | 5 | 25 | 798 | N/A | N/A |
|  | 41 | 2687 | 5 | 25 | 2687 | 15.9 | IMD3 |
| DC\_3A-41A\_n77A  DC\_3A-41C\_n77A  DC\_3A-41A\_n77(2A)  DC\_3A-41C\_n77(2A) | 3 | 1720 | 5 | 25 | 1815 | N/A | N/A |
|  | n77 | 3900 | 10 | 50 | 3900 | N/A | N/A |
|  | 41 | 2640 | 5 | 25 | 2640 | 5.3 | IMD5 |
|  | 41 | 2620 | 5 | 25 | 2620 | N/A | N/A |
|  | n77 | 3400 | 10 | 50 | 3400 | N/A | N/A |
|  | 3 | 1745 | 5 | 25 | 1840 | 16.4 | IMD3 |
| DC\_3A-41A\_n78A  DC\_3A-41C\_n78A  DC\_3A-41A\_n78(2A)  DC\_3A-41C\_n78(2A) | 41 | 2620 | 5 | 25 | 2620 | N/A | N/A |
|  | n78 | 3400 | 10 | 50 | 3400 | N/A | N/A |
|  | 3 | 1745 | 5 | 25 | 1840 | 16.4 | IMD3 |
| DC\_3A\_n41A-n78A | 3 | 1730 | 5 | 25 | 1825 | N/A | N/A |
|  | n41 | 2560 | 10 | 50 | 2560 | N/A | N/A |
|  | n78 | 3390 | 10 | 50 | 3390 | 16.4 | IMD3 |
| DC\_3A-41A\_n79A | 3 | 1770 | 5 | 25 | 1865 | N/A | N/A |
|  | n79 | 4440 | 40 | 216 | 4440 | N/A | N/A |
|  | 41 | 2670 | 5 | 25 | 2670 | 30.2 | IMD2 |
|  | 41 | 2570 | 5 | 25 | 2570 | N/A | N/A |
|  | n79 | 4420 | 40 | 216 | 4420 | N/A | N/A |
|  | 3 | 1755 | 5 | 25 | 1850 | 29.4 | IMD2 |
| DC\_5A-7A\_n71A | 5 | 835 | 5 | 25 | 880 | N/A | N/A |
|  | 7 | 2540 | 5 | 25 | 2660 | 6.5 | IMD5 |
|  | n71 | 680 | 5 | 25 | 634 | N/A | N/A |
| DC\_5A-7A\_n78A | 5 | 844 | 5 | 25 | 889 | N/A | N/A |
|  | 7 | 2525 | 5 | 25 | 2645 | 30.1 | IMD2 |
|  | n78 | 3489 | 10 | 50 | 3489 | N/A | N/A |
|  | 5 | 834 | 5 | 25 | 879 | 30.2 | IMD2 |
|  | 7 | 2550 | 5 | 25 | 2670 | N/A | N/A |
|  | n78 | 3429 | 10 | 50 | 3429 | N/A | N/A |
|  | 5 | 830 | 5 | 25 | 875 | 3.3 | IMD5 |
|  | 7 | 2525 | 5 | 25 | 2645 | N/A | N/A |
|  | n78 | 3350 | 10 | 50 | 3350 | N/A | N/A |
| DC\_5A\_n7A-n78A,  DC\_5A\_n7(2A)-n78A  DC\_5A\_n7A-n78(2A)  DC\_5A\_n7(2A)-n78(2A) | 5 | 844 | 5 | 25 | 889 | N/A | N/A |
|  | n7 | 2525 | 5 | 25 | 2645 | 30.1 | IMD2 |
|  | n78 | 3489 | 10 | 50 | 3489 | N/A | N/A |
|  | 5 | 835 | 5 | 25 | 880 | N/A | N/A |
|  | n7 | 2540 | 5 | 25 | 2660 | N/A | N/A |
|  | n78 | 3375 | 10 | 50 | 3375 | 29.7 | IMD2 |
| DC\_5A\_41A\_n78A | 5 | 860 | 5 | 25 | 885 | 30.2 | IMD2 |
|  | 41 | 2615 | 5 | 25 | 2615 | N/A | N/A |
|  | n78 | 3500 | 10 | 50 | 3500 | N/A | N/A |
|  | 5 | 856.5 | 5 | 25 | 881.5 | 3.1 | IMD5 |
|  | 41 | 2620.5 | 5 | 25 | 2620.5 | N/A | N/A |
|  | n78 | 3490 | 10 | 50 | 3490 | N/A | N/A |
| DC\_5A-41A\_n79A | 5 | 835 | 5 | 25 | 880 | 23.9 | IMD3 |
|  | 41 | 2665 | 5 | 25 | 2665 | N/A | N/A |
|  | n79 | 4450 | 40 | 216 | 4450 | N/A | N/A |
|  | 5 | 826.5 | 5 | 25 | 871.5 | N/A | N/A |
|  | 41 | 2517.5 | 5 | 25 | 2517.5 | 1.8 | IMD4 |
|  | n79 | 4980 | 40 | 216 | 4980 | N/A | N/A |
| DC\_5A-66A\_n2A  DC\_5BA-66A\_n2A  DC\_5A-5A-66A\_n2A  DC\_5A-66A-66A\_n2A  DC\_5B-66A-66A\_n2A  DC\_5A-5A-66A-66A\_n2A | 5 | 834 | 5 | 25 | 879 | N/A | N/A |
|  | 66 | 1712 | 5 | 25 | 2132 | 7.2 | IMD4 |
|  | n2 | 1900 | 5 | 25 | 1980 | N/A | N/A |
| DC\_5A-66A\_n71A | 5 | 830 | 5 | 25 | 875 | N/A | N/A |
|  | 66 | 1761 | 5 | 25 | 2161 | 13 | IMD3 |
|  | n71 | 665.5 | 5 | 25 | 619.5 | N/A | N/A |
|  | 5 | 846.5 | 5 | 25 | 891.5 | 4.2 | IMD5 |
|  | 66 | 1770 | 5 | 25 | 2170 | N/A | N/A |
|  | n71 | 665.5 | 5 | 25 | 619.5 | N/A | N/A |
| DC\_5A-66A\_n78A  DC\_5A-66A\_n78(2A) | 5 | 826.5 | 5 | 25 | 871.5 | N/A | N/A |
|  | 66 | 1742 | 5 | 25 | 2142 | 13.2 | IMD3 |
|  | n78 | 3795 | 10 | 50 | 3795 | N/A | N/A |
| DC\_7A\_n1A-n40A | 7 | 2540 | 5 | 25 | 2660 | N/A | N/A |
|  | n40 | 2335 | 5 | 25 | 2335 | N/A | N/A |
|  | n1 | 1940 | 5 | 25 | 2130 | 15.2 | IMD3 |
| DC\_7A\_n1A-n78A  DC\_7C\_n1A-n78A | 7 | 2520 | 5 | 25 | 2640 | N/A | N/A |
|  | n1 | 1970 | 5 | 25 | 2160 | N/A | N/A |
|  | n78 | 3390 | 10 | 50 | 3390 | 10.1 | IMD4 |
|  | 7 | 2530 | 5 | 25 | 2650 | N/A | N/A |
|  | n1 | 1970 | 5 | 25 | 2160 | 9.0 | IMD4 |
|  | n78 | 3610 | 10 | 50 | 3610 | N/A | N/A |
| DC\_7A\_n3A-n78A | 7 | 2560 | 5 | 25 | 2680 | N/A | N/A |
|  | n3 | 1730 | 5 | 25 | 1825 | N/A | N/A |
|  | n78 | 3390 | 10 | 50 | 3390 | 16.1 | IMD3 |
|  | 7 | 2565 | 5 | 25 | 2685 | N/A | N/A |
|  | n3 | 1725 | 5 | 25 | 1820 | 15.6 | IMD3 |
|  | n78 | 3310 | 10 | 50 | 3310 | N/A | N/A |
| DC\_7A\_n8A-n40A | 7 | 2530 | 5 | 25 | 2650 | N/A | N/A |
|  | n8 | 905 | 5 | 25 | 950 | N/A | N/A |
|  | n40 | 2345 | 5 | 25 | 2345 | 3.0 | IMD5 |
| DC\_7A-8A\_n3A | n3 | 1735 | 5 | 25 | 1830 | N/A | N/A |
|  | 7 | 2530 | 10 | 50 | 2650 | N/A | N/A |
|  | 8 | 895 | 5 | 25 | 940 | 18.0 | IMD3 |
| DC\_7A-8A\_n3A | n3 | 1780 | 5 | 25 | 1875 | N/A | N/A |
|  | 8 | 890 | 5 | 25 | 935 | N/A | N/A |
|  | 7 | 2550 | 10 | 50 | 2670 | 29.0 | IMD2+IMD33 |
| DC\_7A-8A\_n77A | 7 | 2530 | 5 | 25 | 2650 | N/A | N/A |
|  | 8 | 895 | 5 | 25 | 940 | 30.5 | IMD2 |
|  | n77 | 3470 | 10 | 50 | 3470 | N/A | N/A |
| DC\_7A-8A\_n77A | 7 | 2520 | 5 | 25 | 2640 | N/A | N/A |
|  | 8 | 895 | 5 | 25 | 940 | 3.1 | IMD5 |
|  | n77 | 3310 | 10 | 50 | 3310 | N/A | N/A |
| DC\_7A-8A\_n77A | 7 | 2530 | 5 | 25 | 2650 | 28 | IMD2 |
|  | 8 | 895 | 5 | 25 | 940 | N/A | N/A |
|  | n77 | 3545 | 10 | 50 | 3545 | N/A | N/A |
| DC\_7A-8A\_n78A | 7 | 2530 | 5 | 25 | 2650 | N/A | N/A |
|  | 8 | 895 | 5 | 25 | 940 | 30.5 | IMD2 |
|  | n78 | 3470 | 10 | 50 | 3470 | N/A | N/A |
| DC\_7A-8A\_n78A | 7 | 2520 | 5 | 25 | 2640 | N/A | N/A |
|  | 8 | 895 | 5 | 25 | 940 | 3.1 | IMD5 |
|  | n78 | 3310 | 10 | 50 | 3310 | N/A | N/A |
| DC\_7A-8A\_n78A | 7 | 2530 | 5 | 25 | 2650 | 28 | IMD2 |
|  | 8 | 895 | 5 | 25 | 940 | N/A | N/A |
|  | n78 | 3545 | 10 | 50 | 3545 | N/A | N/A |
| DC\_7A\_n8A-n78A | 7 | 2555 | 5 | 25 | 2675 | N/A | N/A |
|  | n8 | 900 | 5 | 25 | 945 | N/A | N/A |
|  | n78 | 3455 | 10 | 50 | 3455 | 28.5 | IMD2 |
|  | 7 | 2555 | 5 | 25 | 2675 | N/A | N/A |
|  | n8 | 900 | 5 | 25 | 945 | 29.7 | IMD2 |
|  | n78 | 3500 | 10 | 50 | 3500 | N/A | N/A |
| DC\_7A-13A\_n66A | 7 | 2520 | 5 | 25 | 2640 | N/A | N/A |
|  | 13 | 781 | 5 | 25 | 750 | 31 | IMD2 |
|  | n66 | 1770 | 5 | 25 | 2170 | N/A | N/A |
| DC\_7A-13A\_n66A | 7 | 2540 | 5 | 25 | 2660 | 18 | IMD3 |
|  | 13 | 780 | 5 | 25 | 749 | N/A | N/A |
|  | n66 | 1720 | 5 | 25 | 2120 | N/A | N/A |
| DC\_7A-20A\_n1A  DC\_7C-20A\_n1A | 7 | 2510 | 10 | 50 | 2630 | N/A | N/A |
|  | 20 | 841 | 10 | 50 | 800 | 4.5 | IMD5 |
|  | n1 | 1940 | 5 | 25 | 2130 | N/A | N/A |
| DC\_7A-20A\_n3A | 7 | 2543 | 10 | 50 | 2663 | N/A | N/A |
|  | 20 | 847 | 10 | 20 | 806 | 10.5 | IMD2 |
|  | n3 | 1737 | 5 | 25 | 1832 | N/A | N/A |
|  | 7 | 2510 | 10 | 50 | 2630 | 26.0 | IMD21 |
|  | 20 | 855 | 5 | 25 | 814 | N/A | N/A |
|  | n3 | 1775 | 10 | 50 | 1870 | N/A | N/A |
| DC\_7A-20A\_n8A | 7 | 2565 | 5 | 25 | 2685 | N/A | N/A |
|  | n8 | 885 | 5 | 25 | 930 | N/A | N/A |
|  | 20 | 836 | 5 | 25 | 795 | 17.4 | IMD3 |
| DC\_7A-20A\_n8A | 7 | 2520 | 5 | 25 | 2640 | 21.1 | IMD3 |
|  | n8 | 900 | 5 | 25 | 945 | N/A | N/A |
|  | 20 | 840 | 5 | 25 | 799 | N/A | N/A |
| DC\_7A-20A\_n8A | 7 | 2504 | 5 | 25 | 2624 | 18.8 | IMD3 |
|  | n8 | 910 | 5 | 25 | 955 | N/A | N/A |
|  | 20 | 857 | 5 | 25 | 816 | N/A | N/A |
| DC\_7A-20A\_n28A | 20 | 842 | 5 | 25 | 801 | N/A | N/A |
|  | n28 | 728 | 5 | 25 | 783 | N/A | N/A |
|  | 7 | 2520 | 10 | 50 | 2640 | 5.9 | IMD5 |
| DC\_7A-20A\_n78A | 7 | 2560 | 5 | 25 | 2680 | N/A | N/A |
|  | 20 | 851 | 5 | 25 | 810 | 30.5 | IMD2 |
|  | n78 | 3370 | 10 | 50 | 3370 | N/A | N/A |
| DC\_7A-20A\_n78A | 7 | 2560 | 5 | 25 | 2680 | N/A | N/A |
|  | 20 | 851 | 5 | 25 | 810 | 3.0 | IMD5 |
|  | n78 | 3435 | 10 | 50 | 3435 | N/A | N/A |
| DC\_7A-20A\_n78A | 7 | 2555 | 5 | 25 | 2675 | 30.8 | IMD2 |
|  | 20 | 845 | 5 | 25 | 804 | N/A | N/A |
|  | n78 | 3520 | 10 | 50 | 3520 | N/A | N/A |
| DC\_7A-28A\_n3A  DC\_7C-28A\_n3A | 7 | 2543 | 5 | 25 | 2663 | N/A | N/A |
|  | 28 | 741 | 5 | 25 | 796.0 | 20.0 | IMD2 |
|  | n3 | 1747 | 5 | 25 | 1842 | N/A | N/A |
|  | 7 | 2540 | 5 | 25 | 2685 | 18 | IMD3 |
|  | 28 | 745 | 5 | 25 | 800 | N/A | N/A |
|  | n3 | 1715 | 5 | 25 | 1810 | N/A | N/A |
| DC\_7A-28A\_n5A DC\_7C-28A\_n5A | 7 | 2540 | 5 | 25 | 2725 | N/A | N/A |
|  | 28 | 721 | 5 | 25 | 776 | 4.4 | IMD5 |
|  | n5 | 829 | 5 | 25 | 854 | N/A | N/A |
|  | 7 | 2510 | 5 | 25 | 2630 | 5.9 | IMD5 |
|  | 28 | 730 | 5 | 25 | 785 | N/A | N/A |
|  | n5 | 840 | 5 | 25 | 874 | N/A | N/A |
| DC\_7A-28A\_n40A | 7 | 2510 | 5 | 25 | 2630 | 5.9 | IMD5 |
|  | 28 | 743 | 5 | 25 | 798 | N/A | N/A |
|  | n40 | 2310 | 5 | 25 | 2310 | N/A | N/A |
| DC\_7A-28A\_n78A | 7 | 2567.5 | 5 | 25 | 2687.5 | N/A | N/A |
|  | 28 | 727.5 | 5 | 25 | 782.5 | 28.8 | IMD2 |
|  | n78 | 3350 | 10 | 50 | 3350 | N/A | N/A |
|  | 7 | 2567.5 | 5 | 25 | 2687.5 | N/A | N/A |
|  | 28 | 727.5 | 5 | 25 | 782.5 | 3.0 | IMD5 |
|  | n78 | 3460 | 10 | 50 | 3460 | N/A | N/A |
|  | 7 | 2530 | 5 | 25 | 2650 | 30.5 | IMD2 |
|  | 28 | 740 | 5 | 25 | 795 | N/A | N/A |
|  | n78 | 3390 | 10 | 50 | 3390 | N/A | N/A |
| DC\_7A\_n28A-n78A  DC\_7C\_n28A-n78A | 7 | 2565 | 5 | 25 | 2685 | N/A | N/A |
|  | n28 | 745 | 5 | 25 | 800 | N/A | N/A |
|  | n78 | 3310 | 10 | 50 | 3310 | 29.7 | IMD2 |
|  | 7 | 2565 | 5 | 25 | 2685 | N/A | N/A |
|  | n78 | 3365 | 10 | 50 | 3365 | N/A | N/A |
|  | n28 | 745 | 5 | 25 | 800 | 28.8 | IMD2 |
| DC\_7A-40A\_n1A | n1 | 1970 | 5 | 25 | 2160 | N/A | N/A |
|  | 7 | 2530 | 5 | 25 | 2650 | 32.1 | IMD3 |
|  | 40 | 2310 | 5 | 25 | 2310 | N/A | N/A |
| DC\_7A-46A\_n78A6 | 7 | N/A | N/A | N/A | N/A | N/A | N/A |
|  | 46 | N/A | N/A | N/A | N/A | N/A | IMD2, IMD5 |
|  | n78 | N/A | N/A | N/A | N/A | N/A | N/A |
| DC\_7A-66A\_n78A  DC\_7C-66A\_n78A  DC\_7A-7A-66A\_n78A  DC\_7A-66A-66A\_n78A  DC\_7A-7A-66A-66A\_n78A  DC\_7C-66A-66A\_n78A  DC\_7A\_n66A-n78A  DC\_7A-7A\_n66A-n78A  DC\_7C\_n66A-n78A  DC\_7A-66A\_n78(2A)  DC\_7C-66A\_n78(2A)  DC\_7A-7A-66A\_n78(2A)  DC\_7A-66A-66A\_n78(2A)  DC\_7A-7A-66A-66A\_n78(2A)  DC\_7C-66A-66A\_n78(2A) | 7 | 2550 | 5 | 25 | 2685 | N/A | N/A |
|  | 66/n66 | 1750 | 5 | 25 | 2150 | 8.7 | IMD4 |
|  | n78 | 3625 | 10 | 50 | 3475 | N/A | N/A |
| DC\_7A\_n66A-n78A  DC\_7A-7A\_n66A-n78A  DC\_7C\_n66A-n78A | 7 | 2542 | 5 | 25 | 2662 | N/A | N/A |
|  | n66 | 1740 | 5 | 25 | 2140 | N/A | N/A |
|  | n78 | 3344 | 10 | 50 | 3344 | 16.0 | IMD3 |
| DC\_7A\_SUL\_n78A-n80A | n80 | 1730 | 5 | 25 |  | N/A | N/A |
|  | 7 | 2535 | 10 | 50 | 2655 | 13 | IMD4 |
| DC\_8A\_n1A-n78A | 8 | 900 | 5 | 25 | 945 | N/A | N/A |
|  | n1 | 1945 | 5 | 25 | 2135 | N/A | N/A |
|  | n78 | 3745 | 10 | 50 | 3745 | 14.9 | IMD3 |
| DC\_8A\_n3A-n28A | 8 | 912.5 | 5 | 25 | 957.5 | N/A | N/A |
|  | n3 | 1712.5 | 5 | 25 | 1807.5 | N/A | N/A |
|  | n28 | 745 | 5 | 25 | 800 | 30.4 | IMD2 |
| DC\_8A-11A\_n77A | 8 | 910 | 5 | 25 | 955 | N/A | N/A |
|  | n77 | 3311 | 10 | 50 | 3311 | N/A | N/A |
|  | 11 | 1443 | 5 | 25 | 1491 | 18.8 | IMD3 |
| DC\_8A-11A\_n77A | 11 | 1430.5 | 5 | 25 | 1478.5 | N/A | N/A |
|  | n77 | 3791 | 10 | 50 | 3791 | N/A | N/A |
|  | 8 | 885 | 5 | 25 | 930 | 18.2 | IMD3 |
| DC\_8A-11A\_n78A | 8 | 910 | 5 | 25 | 955 | N/A | N/A |
|  | n78 | 3311 | 10 | 50 | 3311 | N/A | N/A |
|  | 11 | 1443 | 5 | 25 | 1491 | 18.8 | IMD3 |
| DC\_8A-11A\_n78A | 11 | 1430.5 | 5 | 25 | 1478.5 | N/A | N/A |
|  | n78 | 3791 | 10 | 50 | 3791 | N/A | N/A |
|  | 8 | 885 | 5 | 25 | 930 | 18.2 | IMD3 |
| DC\_8A-20A\_n78A | 8 | 890 | 5 | 25 | 935 | N/A | N/A |
|  | n78 | 3470 | 10 | 50 | 3470 | N/A | N/A |
|  | 20 | 841 | 5 | 25 | 800 | 12.1 | IMD4 |
|  | 8 | 895 | 5 | 25 | 940 | 12.1 | IMD4 |
|  | n78 | 3481 | 10 | 50 | 3481 | N/A | N/A |
|  | 20 | 847 | 5 | 25 | 806 | N/A | N/A |
| DC\_8A\_n28A-n77A | 8 | 910 | 5 | 25 | 955 | N/A | N/A |
|  | n28 | 743 | 5 | 25 | 798 | N/A | N/A |
|  | n77 | 3473 | 10 | 50 | 3473 | 10.3 | IMD4 |
|  | 8 | 910 | 5 | 25 | 955 | N/A | N/A |
|  | n28 | 710 | 5 | 25 | 765 | 11.6 | IMD4 |
|  | n77 | 3495 | 10 | 50 | 3495 | N/A | N/A |
| DC\_8A\_n40A-n79A | 8 | 885 | 5 | 25 | 930 | N/A | N/A |
|  | n40 | 2305 | 5 | 25 | 2305 | N/A | N/A |
|  | n79 | 4960 | 40 | 216 | 4960 | 10.7 | IMD4 |
|  | 8 | 885 | 5 | 25 | 930 | N/A | N/A |
|  | n40 | 2305 | 5 | 25 | 2305 | 9.2 | IMD4 |
|  | n79 | 4960 | 40 | 216 | 4960 | N/A | N/A |
| DC\_8A\_n41A-n79A | 8 | 910 | 5 | 25 | 955 | N/A | N/A |
|  | n41 | 2650 | 10 | 50 | 2650 | N/A | N/A |
|  | n79 | 4470 | 40 | 216 | 4470 | 16.3 | IMD3 |
|  | 8 | 910 | 5 | 25 | 955 | N/A | N/A |
|  | n41 | 2650 | 10 | 50 | 2650 | 15.5 | IMD3 |
|  | n79 | 4470 | 40 | 216 | 4470 | N/A | N/A |
| DC\_8A-42A\_n28A | 8 | 900 | 5 | 25 | 945 | N/A | N/A |
|  | n28 | 743 | 5 | 25 | 798 | N/A | N/A |
|  | 42 | 3443 | 5 | 25 | 3443 | 8.7 | IMD4 |
| DC\_8A\_SUL\_n78A-n80A | n80 | 1755 | 10 | 50 |  | N/A | N/A |
|  | 8 | 900 | 5 | 25 | 945 | 8 | IMD4 |
|  | n80 | 1750 | 10 | 50 |  | N/A | N/A |
|  | 8 | 900 | 5 | 25 | 945 | N/A | N/A |
|  | n78 | 3550 | 10 | 50 | 3550 | 8 | IMD33 |
| DC\_11A-18A\_n77A | 11 | 1443 | 5 | 25 | 1491 | N/A | N/A |
|  | n77 | 3706 | 10 | 50 | 3706 | N/A | N/A |
|  | 18 | 820 | 5 | 25 | 865 | 18.7 | IMD3 |
| DC\_11A-18A\_n78A | 11 | 1443 | 5 | 25 | 1491 | N/A | N/A |
|  | n78 | 3706 | 10 | 50 | 3706 | N/A | N/A |
|  | 18 | 820 | 5 | 25 | 865 | 18.7 | IMD3 |
| DC\_12A\_n7A-n78A,  DC\_12A\_n7(2A)-n78A  DC\_12A\_n7A-n78(2A)  DC\_12A\_n7(2A)-n78(2A) | 12 | 708 | 5 | 25 | 738 | N/A | N/A |
|  | n7 | 2520 | 5 | 25 | 2640 | N/A | N/A |
|  | n78 | 3624 | 10 | 50 | 3624 | 9 | IMD4 |
|  | 12 | 708 | 5 | 25 | 738 | N/A | N/A |
|  | n78 | 3370 | 10 | 50 | 3370 | N/A | N/A |
|  | n7 | 2542 | 5 | 25 | 2662 | 29.6 | IMD2 |
| DC\_12A-30A\_n2A | 12 | 708.5 | 5 | 25 | 738.5 | N/A | N/A |
|  | 30 | 2308 | 5 | 25 | 2353 | 12.0 | IMD4 |
|  | n2 | 1885 | 5 | 25 | 1965 | N/A | N/A |
| DC\_13A-66A\_n2A  DC\_13A-66A-66A\_n2A | 13 | 782 | 5 | 25 | 751 | N/A | N/A |
|  | 66 | 1736 | 5 | 25 | 2156 | 7..2 | IMD4 |
|  | n2 | 1860 | 5 | 25 | 1940 | N/A | N/A |
| DC\_12A-66A\_n25A | 12 | 708.5 | 5 | 25 | 738.5 | N/A | N/A |
|  | 66 | 1775 | 5 | 25 | 2175 | N/A | N/A |
|  | n25 | 1855 | 5 | 25 | 1935 | 20 | IMD3 |
|  | 12 | 708.5 | 5 | 25 | 738.5 | N/A | N/A |
|  | 66 | 1750 | 5 | 25 | 2150 | 4 | IMD5 |
|  | n25 | 1883.3 | 5 | 25 | 1963.3 | N/A | N/A |
|  | 12 | 708.5 | 5 | 25 | 738.5 | N/A | N/A |
|  | 66 | 1712.5 | 5 | 25 | 2112.5 | 23 | IMD3 |
|  | n25 | 1912.5 | 5 | 25 | 1992.5 | N/A | N/A |
| DC\_13A-66A\_n48A  DC\_13A-66A\_n48B  DC\_13A-66A-66A\_n48A  DC\_13A-66A-66A\_n48B | 13 | 782 | 5 | 25 | 751 | N/A | N/A |
|  | 66 | 1731 | 5 | 25 | 2131 | 17.1 | IMD3 |
|  | n48 | 3695 | 5 | 25 | 3695 | N/A | N/A |
| DC\_18A\_n3A-n77A | 18 | 820 | 5 | 25 | 865 | N/A | N/A |
|  | n3 | 1770 | 5 | 25 | 1865 | N/A | N/A |
|  | n77 | 3410 | 10 | 50 | 3410 | 16.3 | IMD3 |
|  | 18 | 820 | 5 | 25 | 865 | N/A | N/A |
|  | n3 | 1770 | 5 | 25 | 1865 | 15.7 | IMD3 |
|  | n77 | 3505 | 10 | 50 | 3505 | N/A | N/A |
| DC\_14A-66A\_n2A  DC\_14A-66A-66A\_n2A | 14 | 793 | 5 | 25 | 763 | N/A | N/A |
|  | 66 | 1762 | 5 | 25 | 2162 | 7.6 | IMD4 |
|  | n2 | 1874 | 5 | 25 | 1954 | N/A | N/A |
| DC\_18A\_n3A-n78A | 18 | 820 | 5 | 25 | 865 | N/A | N/A |
|  | n3 | 1750 | 5 | 25 | 1845 | N/A | N/A |
|  | n78 | 3390 | 10 | 50 | 3390 | 15.2 | IMD33 |
| DC\_18A-28A\_n77A | 18 | 820 | 5 | 25 | 865 | N/A | N/A |
|  | 28 | 723 | 5 | 25 | 778 | 4.4 | IMD5 |
|  | n77 | 4058 | 10 | 50 | 4058 | N/A | N/A |
| DC\_18A-28A\_n77A | 18 | 820 | 5 | 25 | 865 | 3.9 | IMD5 |
|  | 28 | 723 | 5 | 25 | 778 | N/A | N/A |
|  | n77 | 3757 | 10 | 50 | 3757 | N/A | N/A |
| DC\_18A-28A\_n78A | 18 | 819 | 5 | 25 | 864 | 3.8 | IMD5 |
|  | 28 | 723 | 5 | 25 | 778 | N/A | N/A |
|  | n78 | 3756 | 10 | 50 | 3756 | N/A | N/A |
| DC\_18A-41A\_n3A  DC\_18A-41C\_n3A | 18 | 820 | 5 | 25 | 865 | N/A | N/A |
|  | n3 | 1725 | 5 | 25 | 1820 | N/A | N/A |
|  | 41 | 2630 | 5 | 25 | 2630 | 16.0 | IMD3 |
|  | 18 | 820 | 5 | 25 | 865 | 28.9 | IMD21 |
|  | n3 | 1765 | 5 | 25 | 1860 | N/A | N/A |
|  | 41 | 2630 | 5 | 25 | 2630 | N/A | N/A |
| DC\_18A-41A\_n77A  DC\_18A-41C\_n77A | 18 | 820 | 5 | 25 | 865 | 3.4 | IMD5 |
|  | n77 | 3527.5 | 10 | 50 | 3527.5 | N/A | N/A |
|  | 41 | 2640 | 5 | 25 | 2640 | N/A | N/A |
| DC\_18A-41A\_n78A  DC\_18A-41C\_n78A | 18 | 820 | 5 | 25 | 865 | 3.4 | IMD5 |
|  | n78 | 3527.5 | 10 | 50 | 3527.5 | N/A | N/A |
|  | 41 | 2640 | 5 | 25 | 2640 | N/A | N/A |
| DC\_19A-21A\_n77A  DC\_19A-21A\_n78A | 19 | 837.5 | 5 | 25 | 882.5 | 18.7 | IMD3 |
|  | 21 | 1450.4 | 5 | 25 | 1498.4 | N/A | N/A |
|  | n77, n78 | 3783.3 | 10 | 50 | 3783.3 | N/A | N/A |
| DC\_19A-21A\_n77A | 19 | 837.5 | 5 | 25 | 882.5 | N/A | N/A |
|  | 21 | 1454.5 | 5 | 25 | 1502.5 | 9.0 | IMD4 |
|  | n77 | 4015 | 10 | 50 | 4015 | N/A | N/A |
| DC\_19A-21A\_n79A | 19 | N/A | N/A | N/A | N/A | N/A | IMD5 |
|  | 21 | N/A | N/A | N/A | N/A | N/A | N/A |
|  | n79 | N/A | N/A | N/A | N/A | N/A | N/A |
|  | 19 | 837.5 | 5 | 25 | 882.2 | N/A | N/A |
|  | 21 | 1452 | 5 | 25 | 1500 | 3.8 | IMD5 |
|  | n79 | 4850 | 40 | 216 | 4850 | N/A | N/A |
| DC\_20A\_n1A-n78A | 20 | 845 | 5 | 25 | 804 | N/A | N/A |
|  | n1 | 1940 | 5 | 25 | 2130 | N/A | N/A |
|  | n78 | 3630 | 10 | 50 | 3630 | 16.0 | IMD3 |
|  | 20 | 835 | 5 | 25 | 794 | N/A | N/A |
|  | n1 | 1930 | 5 | 25 | 2120 | 15.3 | IMD3 |
|  | n78 | 3790 | 10 | 50 | 3790 | N/A | N/A |
| DC\_20A\_n3A-n78A | 20 | 845 | 5 | 25 | 804 | N/A | N/A |
|  | n3 | 1730 | 5 | 25 | 1825 | N/A | N/A |
|  | n78 | 3420 | 10 | 50 | 3420 | 16.1 | IMD3 |
|  | 20 | 845 | 5 | 25 | 804 | N/A | N/A |
|  | n3 | 1765 | 5 | 25 | 1860 | 15.7 | IMD3 |
|  | n78 | 3550 | 10 | 50 | 3550 | N/A | N/A |
| DC\_20A\_38A-n78A | 20 | N/A | N/A | N/A | N/A | N/A | IMD2 |
|  | 38 | N/A | N/A | N/A | N/A | N/A | N/A |
|  | n78 | N/A | N/A | N/A | N/A | N/A | N/A |
|  | 20 | N/A | N/A | N/A | N/A | N/A | N/A |
|  | 38 | N/A | N/A | N/A | N/A | N/A | IMD2 |
|  | n78 | N/A | N/A | N/A | N/A | N/A | N/A |
| DC\_20A\_n7A-n28A | 20 | 857 | 5 | 25 | 816 | N/A | N/A |
|  | n7 | 2512 | 5 | 25 | 2632 | N/A | N/A |
|  | n28 | 743 | 5 | 25 | 798 | 13.9 | IMD3 |
|  | 20 | 852 | 5 | 25 | 811 | N/A | N/A |
|  | n7 | 2550 | 10 | 50 | 2670 | 5.9 | IMD5 |
|  | n28 | 738 | 5 | 25 | 793 | N/A | N/A |
| DC\_20A\_SUL\_n78A-n80A | 20 | 847 | 5 | 25 | 806 | 9 | IMD4 |
|  | n80 | 1735 | 5 | 25 |  | N/A | N/A |
| DC\_20A\_n41A-n78A | 20 | 845 | 5 | 25 | 804 | N/A | N/A |
|  | n41 | 2675 | 10 | 50 | 2675 | 29.8 | IMD2 |
|  | n78 | 3520 | 10 | 50 | 3520 | N/A | N/A |
|  | 20 | 850 | 5 | 25 | 809 | N/A | N/A |
|  | n41 | 2550 | 10 | 50 | 2550 | N/A | N/A |
|  | n78 | 3400 | 10 | 50 | 3400 | 28.8 | IMD2 |
| DC\_21A-28A\_n77A | 21 | 1452 | 5 | 25 | 1500 | N/A | N/A |
|  | 28 | 730.5 | 5 | 25 | 785.5 | 16.9 | IMD3 |
|  | n77 | 3689.5 | 10 | 50 | 3689.5 | N/A | N/A |
|  | 21 | 1450.5 | 5 | 25 | 1498.5 | 9.9 | IMD4 |
|  | 28 | 730.5 | 5 | 25 | 785.5 | N/A | N/A |
|  | n77 | 3690 | 10 | 50 | 3690 | N/A | N/A |
| DC\_21A-28A\_n79A | 21 | 1450 | 5 | 25 | 1498 | 5.2 | IMD5 |
|  | 28 | 730.5 | 5 | 25 | 785.5 | N/A | N/A |
|  | n79 | 4420 | 40 | 216 | 4420 | N/A | N/A |
| DC\_28A\_n3A-n77A | 28 | 735 | 5 | 25 | 790 | N/A | N/A |
|  | n3 | 1755 | 5 | 25 | 1850 | 17.0 | IMD3 |
|  | n77 | 3320 | 10 | 50 | 3320 | N/A | N/A |
|  | 28 | 733 | 5 | 25 | 788 | N/A | N/A |
|  | n3 | 1720 | 5 | 25 | 1815 | N/A | N/A |
|  | n77 | 4173 | 10 | 50 | 4173 | 15.9 | IMD3 |
| DC\_28A\_n7A-n78A  DC\_28A\_n7B-n78A | 28 | 745 | 5 | 25 | 800 | N/A | N/A |
|  | n7 | 2565 | 5 | 25 | 2685 | N/A | N/A |
|  | n78 | 3310 | 10 | 50 | 3310 | 29.7 | IMD2 |
|  | 28 | 740 | 5 | 25 | 795 | N/A | N/A |
|  | n7 | 2530 | 5 | 25 | 2650 | 30.5 | IMD2 |
|  | n78 | 3390 | 10 | 50 | 3390 | N/A | N/A |
| DC\_28A-41A\_n77A | 28 | 738 | 5 | 25 | 793 | N/A | N/A |
|  | n77 | 3380 | 10 | 50 | 3380 | N/A | N/A |
|  | 41 | 2642 | 5 | 25 | 2642 | 29.5 | IMD2 |
| DC\_28A-41A\_n77A | 41 | 2642 | 5 | 25 | 2642 | N/A | N/A |
|  | n77 | 3440 | 10 | 50 | 3440 | N/A | N/A |
|  | 28 | 743 | 5 | 25 | 798 | 30.8 | IMD2 |
| DC\_28A-41A\_n77A | 41 | 2567.5 | 10 | 50 | 2567.5 | N/A | N/A |
|  | n77 | 3460 | 10 | 50 | 3460 | N/A | N/A |
|  | 28 | 727.5 | 5 | 25 | 782.5 | 3.0 | IMD5 |
| DC\_28A-41A\_n78A | 28 | 738 | 5 | 25 | 793 | N/A | N/A |
|  | n78 | 3380 | 10 | 50 | 3380 | N/A | N/A |
|  | 41 | 2642 | 5 | 25 | 2642 | 29.5 | IMD2 |
| DC\_28A-41A\_n78A | 41 | 2642 | 5 | 25 | 2642 | N/A | N/A |
|  | n78 | 3440 | 10 | 50 | 3440 | N/A | N/A |
|  | 28 | 743 | 5 | 25 | 798 | 30.8 | IMD2 |
| DC\_28A-41A\_n79A | 28 | 743 | 5 | 25 | 798 | N/A | N/A |
|  | n79 | 4739 | 40 | 216 | 4739 | N/A | N/A |
|  | 41 | 2510 | 5 | 25 | 2510 | 8.6 | IMD4 |
| DC\_28A-41A\_n79A | 41 | 2650 | 5 | 25 | 2650 | N/A | N/A |
|  | n79 | 4502 | 40 | 216 | 4502 | N/A | N/A |
|  | 28 | 743 | 5 | 25 | 798 | 15.9 | IMD3 |
| DC\_28A-42A\_79A | 28 | 730 | 5 | 25 | 785 | N/A | N/A |
|  | 42 | 3420 | 5 | 25 | 3420 | 15.3 | IMD3 |
|  | n79 | 4880 | 40 | 216 | 4880 | N/A | N/A |
|  | 28 | 745 | 5 | 25 | 800 | 16.2 | IMD2 |
|  | 42 | 3597.5 | 5 | 25 | 3597.5 | N/A | N/A |
|  | n79 | 4420 | 40 | 216 | 4420 | N/A | N/A |
| DC\_19A\_n78A-n79A | 19 | 835 | 5 | 25 | 880 | N/A | N/A |
|  | n78 | 3680 | 10 | 50 | 3680 | N/A | N/A |
|  | n79 | 4515 | 40 | 216 | 4515 | 29.3 | IMD2 |
|  | 19 | 835 | 5 | 25 | 880 | N/A | N/A |
|  | n79 | 4550 | 40 | 216 | 4550 | N/A | N/A |
|  | n78 | 3715 | 10 | 50 | 3715 | 28.8 | IMD2 |
| DC\_20A\_n28A-n78A, DC\_20A\_SUL\_n78A-n83A | 20 | 857 | 5 | 25 | 816 | N/A | N/A |
|  | n28, n83 | 743 | 5 | 25 | 798 | N/A | N/A |
|  | n78 | 3314 | 10 | 50 | 3314 | 8.7 | IMD4 |
|  | 20 | 837 | 5 | 25 | 796 | N/A | N/A |
|  | n78 | 3310 | 10 | 50 | 3310 | N/A | N/A |
|  | n28 | 744 | 5 | 25 | 799 | 9.4 | IMD4 |
| DC\_21A\_n78A-n79A | 21 | 1453 | 5 | 25 | 1501 | N/A | N/A |
|  | n78 | 3420 | 10 | 50 | 3420 | N/A | N/A |
|  | n79 | 4873 | 40 | 216 | 4873 | 30.1 | IMD2 |
|  | 21 | 1453 | 5 | 25 | 1501 | N/A | N/A |
|  | n79 | 4940 | 40 | 216 | 4940 | N/A | N/A |
|  | n78 | 3487 | 10 | 50 | 3487 | 29.8 | IMD2 |
| DC\_28A\_n8A-n78A | 28 | 728 | 5 | 25 | 783 | N/A | N/A |
|  | n8 | 910 | 5 | 25 | 955 | N/A | N/A |
|  | n78 | 3458 | 10 | 50 | 3458 | 9.1 | IMD4 |
|  | 28 | 713 | 5 | 25 | 768 | N/A | N/A |
|  | n8 | 890 | 5 | 25 | 935 | 4.3 | IMD5 |
|  | n78 | 3787 | 10 | 50 | 3787 | N/A | N/A |
| DC\_29A-30A\_n66A | 29 | N/A | 5 | 25 | 719.5 | 4.5 | IMD5 |
| 30 | 2307.5 | 5 | 25 | 2352.5 | N/A | N/A |
| n66 | 1777.5 | 5 | 25 | 2177.5 | N/A | N/A |
| DC\_30A-66A\_n5A,  DC\_30A-66A-66A\_n5A,  DC\_30A-66A-66A-66A\_n5A | 30 | 2310 | 5 | 25 | 2355 | N/A | N/A |
|  | 66 | 1730 | 5 | 25 | 2130 | 2.5 | IMD5 |
|  | n5 | 830 | 5 | 25 | 875 | N/A | N/A |
| DC\_39A\_n40A-n79A | 39 | 1917.5 | 5 | 25 | 1917.5 | N/A | N/A |
|  | n40 | 2302.5 | 5 | 25 | 2302.5 | N/A | N/A |
|  | n79 | 4980 | 40 | 216 | 4980 | 5.8 | IMD4 |
| DC\_39A\_n41A-n79A | 39 | 1900 | 5 | 25 | 1900 | N/A | N/A |
|  | n41 | 2620 | 10 | 50 | 2620 | N/A | N/A |
|  | n79 | 4520 | 40 | 216 | 4520 | 29.8 | IMD24 |
|  | 39 | 1900 | 5 | 25 | 1900 | N/A | N/A |
|  | n41 | 2620 | 10 | 50 | 2620 | 30.2 | IMD24 |
|  | n79 | 4520 | 40 | 216 | 4520 | N/A | N/A |
| DC\_41A\_n3A-n77A  DC\_41C\_n3A-n77A  DC\_41A\_n3A-n78A  DC\_41C\_n3A-n78A | 41 | 2620 | 5 | 25 | 2620 | N/A | N/A |
|  | n3 | 1745 | 5 | 25 | 1840 | 16.4 | IMD3 |
|  | n77/n78 | 3400 | 10 | 50 | 3400 | N/A | N/A |
|  | 41 | 2580 | 5 | 25 | 2580 | N/A | N/A |
|  | n3 | 1720 | 5 | 25 | 1815 | N/A | N/A |
|  | n77/n78 | 3440 | 10 | 50 | 3440 | 16.8 | IMD34 |
| DC\_41A\_n28A-n77A  DC\_41C\_n28A-n77A  DC\_41A\_n28A-n78A  DC\_41C\_n28A-n78A | 41 | 2580 | 5 | 25 | 2580 | N/A | N/A |
|  | n28 | 743 | 5 | 25 | 798 | N/A | N/A |
|  | n77/n78 | 3323 | 10 | 50 | 3323 | 28.2 | IMD21 |
|  | 41 | 2642 | 5 | 25 | 2642 | N/A | N/A |
|  | n28 | 743 | 5 | 25 | 798 | 30.8 | IMD21 |
|  | n77/n78 | 3440 | 10 | 50 | 3440 | N/A | N/A |
| DC\_46A-66A\_n5A | 46 | 5163 | 10 | 50 | 5163 | 9.0 | IMD4 |
|  | 66 | 1775 | 5 | 25 | 2175 | N/A | N/A |
|  | n5 | 847 | 5 | 25 | 892 | N/A | N/A |
| DC\_46A-66A\_n25A4  DC\_46C-66A\_n25A4  DC\_46D-66A\_n25A4 | 46 | 5505 | 10 | 50 | 5505 | 16.1 | IMD3 |
|  | 66 | 1775 | 5 | 25 | 2175 | N/A | N/A |
|  | n25 | 1855 | 5 | 25 | 1935 | 20 | IMD3 |
|  | 46 | 5505 | 10 | 50 | 5505 | 16.1 | IMD3 |
|  | 66 | 1750 | 5 | 25 | 2150 | 4 | IMD5 |
|  | n25 | 1883.3 | 5 | 25 | 1963.3 | N/A | N/A |
|  | 46 | 5505 | 10 | 50 | 5505 | 16.1 | IMD3 |
|  | 66 | 1712.5 | 5 | 25 | 2112.5 | 23 | IMD3 |
|  | n25 | 1912.5 | 5 | 25 | 1992.5 | N/A | N/A |
| DC\_48A-66A\_n12A | 48 | 3580 | 5 | 25 | 3580 | N/A | N/A |
|  | 66 | 1760 | 5 | 25 | 2160 | 17.1 | IMD3 |
|  | n12 | 710 | 5 | 25 | 740 | N/A | N/A |
| DC\_48A-66A\_n71A | 48 | 3560 | 5 | 25 | 3560 | N/A | N/A |
|  | 66 | 1774 | 5 | 25 | 2174 | 15.8 | IMD3 |
|  | n71 | 693 | 5 | 25 | 647 | N/A | N/A |
|  | 48 | 3697.5 | 5 | 25 | 3697.5 | 13.0 | IMD4 |
|  | 66 | 1712.5 | 5 | 25 | 2112.5 | N/A | N/A |
|  | n71 | 665.5 | 5 | 25 | 619.5 | N/A | N/A |
| DC\_66A\_n7A-n78A,  DC\_66A-66A\_n7A-n78  DC\_66A\_n7(2A)-n78A  DC\_66A-66A\_n7(2A)-n78A  DC\_66A\_n7A-n78(2A)  DC\_66A-66A\_n7A-n78(2A)  DC\_66A-66A\_n7(2A)-n78(2A) | 66 | 1730 | 5 | 25 | 2130 | N/A | N/A |
|  | n7 | 2560 | 5 | 25 | 2680 | N/A | N/A |
|  | n78 | 3390 | 10 | 50 | 3390 | 16.1 | IMD3 |
| DC\_66A\_n25A-n41A | 66 | 1715 | 5 | 25 | 2115 | N/A | N/A |
|  | n41 | 2685 | 10 | 50 | 2685 | N/A | N/A |
|  | n25 | 1860 | 5 | 25 | 1940 | 5 | 11.0 |
| DC\_66A\_n38A-n78A | 66 | 1760 | 5 | 25 | 2160 | N/A | N/A |
|  | n38 | 2610 | 5 | 25 | 2610 | N/A | N/A |
|  | n78 | 3460 | 10 | 50 | 3460 | 15.0 | IMD3 |
| DC\_66A\_n66A-n78A | 66 | 1775 | 5 | 25 | 2175 | N/A | N/A |
|  | n66 | 1725 | 5 | 25 | 2125 | 2.8 | IMD5 |
|  | n78 | 3725 | 10 | 50 | 3725 | N/A | N/A |
| NOTE 1: This band is subject to IMD3 also which MSD is not specified.  NOTE 2: For DC\_3A\_n3A-n77A, DC\_3A\_n3A-n78A paired with UL\_DC\_3A\_n3A, the 3rd DL bands n77/n78 are subject to IMD2 which MSD is not specified  NOTE 3: This MSD requirement apply with both IMD2 and IMD3 products should be generated.  NOTE 4: This band is subject to IMD5 also which MSD is not specified.  NOTE 5: When Band 46 have self-interference problems by dual uplink CA/EN-DC, then the requirements do not apply in exclusion zone which is frequency range within (harmonics frequency region + FHD) and IMD frequency region as follow.  IMD frequency range   |  |  |  |  | | --- | --- | --- | --- | | DL\_CA configuration | UL\_CA configuration | Exclusion zone center frequency | Exclusion zone BW | | DC\_2A-46A\_n66A | DC\_2A\_n66A | 2\*fc\_2A + fc\_n66A | 2\*BW\_2A + BW\_n66A | | DC\_2A-46A\_n66A | DC\_2A\_n66A | fc\_2A + 2\*fc\_n66A | BW\_2A + 2\*BW\_n66A |   NOTE 6: For NR band, UL/DL BW and UL LCRB can be adjusted according to the supported BW and lowest SCS supported by the UE.  NOTE 7: E-UTRA carrier shall be set to min(+20 dBm, PCMAX\_L\_E-UTRA,c) and NR carrier shall be set to min(+20 dBm, PCMAX\_L,f,c,NR) as defined in clause 6.2B.4.1.3. | | | | | | | |

## ***<Next change>***

## 7.5F Adjacent channel selectivity

### 7.5F.2 Intra-band contiguous shared spectrum channel access CA

ACS for intra-band contiguous shared access CA requirements are specified in Table 7.5F.2-1. These requirements apply for any SCS specified for the channel bandwidth of the wanted signal. For the test parameters specified in Table 7.5F.2-2, the throughput of each carrier shall be ≥ 95 % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, 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).

Table 7.5F.2-1: ACS for intra-band contiguous shared access CA

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | NR-U CA bandwidth class | | | | | | | |
| Rx Parameter | Units | B | C | D | E | I | M | N | O |
| ACS | dB | 24 – 10log10(BWChannel\_CA/20) | | | | | | | |

Table 7.5F.2-2: Test parameters for intra-band contiguous NR-U CA

|  |  |  |
| --- | --- | --- |
| Rx Parameter | Units | NR-U CA bandwidth class |
|  |  | B, C, D, E, M, N, O |
| Pw in Transmission Bandwidth Configuration, per CC | dBm | REFSENS + 14 dB |
| PInterferer | dBm | Aggregated power + 22.5 – 10log10(BWChannel\_CA/20) dB |
| BWInterferer | MHz | 20 |
| FInterferer (offset) | MHz | 10 + Foffset  /  -10 - Foffset |
| NOTE 1: The transmitter shall be set to 4 dB below PCMAX\_L,f,c at the minimum UL configuration specified in Table 7.3.2-3 with PCMAX\_L,f,c defined in clause 6.2.4 .  NOTE 2: The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to MHz with SCS the sub-carrier spacing of the carrier closest to the interferer in MHz. The interferer is an NR signal with an SCS equal to that of the closest carrier.  NOTE 3: The interferer consists of the RMC specified in Annexes A.3.2.2 and A.3.3.2 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. | | |

## ***<Next change>***

### 7.6.3 Out-of-band blocking

For NR bands with FDL\_high < 2700 MHz and FUL\_high < 2700 MHz out-of-band band blocking is defined for an unwanted CW interfering signal falling outside a frequency range 15 MHz below or above the UE receive band. The throughput of the wanted signal shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, 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 7.6.3-1 and Table 7.6.3-2. The relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal. For operating bands with an unpaired DL part (as noted in Table 5.2-1), the requirements only apply for carriers assigned in the paired part.

Table 7.6.3-1: Out-of-band blocking parameters for NR bands with FDL\_high < 2700 MHz and FUL\_high < 2700 MHz

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| RX parameter | Units | Channel bandwidth | | | | |
|  |  | 5 MHz | 10 MHz | 15 MHz | 20 MHz | 25 MHz |
| Power in transmission bandwidth configuration | dBm | REFSENS + channel specific value below | | | | |
|  | dB | 6 | 6 | 7 | 9 | 10 |
| RX parameter | Units | Channel bandwidth | | | | |
|  |  | 30 MHz | 40 MHz | 50 MHz | 60 MHz | 80 MHz |
| Power in transmission bandwidth configuration | dBm | REFSENS + channel bandwidth specific value below | | | | |
|  | dB | 11 | 12 | 13 | 14 | 15 |
| RX parameter | Units | Channel bandwidth | | | | |
|  |  | 90 MHz | 100 MHz |  |  |  |
| Power in transmission bandwidth configuration | dBm | REFSENS + channel bandwidth specific value below | |  |  |  |
|  | dB | 15.5 | 16 |  |  |  |
| NOTE: The transmitter shall be set to 4 dB below PCMAX\_L,f,c at the minimum UL configuration specified in Table 7.3.2-3 with PCMAX\_L,f,c defined in clause 6.2.4. | | | | | | |

Table 7.6.3-2: Out of-band blocking for NR bands with FDL\_high < 2700 MHz and FUL\_high < 2700 MHz

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| NR band | Parameter | Unit | Range 1 | Range 2 | Range 3 |
| n1, n2, n3, | Pinterferer | dBm | -44 | -30 | -15 |
| n5, n7, n8, n12, n14, n18, n20, n25, n26, n28, n30, n34, n38, n39, n40, n41, n485, n50, n51, n536, n65, n66, n70, n71, n74, n75, n76, n91, n92, n93, n94 | Finterferer (CW) | MHz | -60 < f – FDL\_low < -15  or  15 < f – FDL\_high < 60 | -85 < f – FDL\_low ≤ -60  or  60 ≤ f – FDL\_high < 85 | 1 ≤ f ≤ FDL\_low – 85  or  FDL\_high + 85 ≤ f  ≤ 12750 |
| NOTE 1: The power level of the interferer (PInterferer) for Range 3 shall be modified to -20 dBm for FInterferer > 6000 MHz.  NOTE 2: For band 51 the FDL\_high of band 50 is applied as FDL\_high for band 51. For band 50, the FDL\_low of band 51 is applied as FDL\_low for band 50.  NOTE 3: For band 76 the FDL\_high of band 75 is applied as FDL\_high for band 76. For band 75, the FDL\_low of band 76 is applied as FDL\_low for band 75.  NOTE 4: For UEs supporting both bands 38 and 41, the FDL\_high and FDL\_low of band 41 is applied as FDL\_high and FDL\_low for band 38.  NOTE 5: n48 follows the requirement in this frequency range according to the general requirement defined in Clause 7.1. The power level of the interferer (PInterferer) for Range 3 shall be modified to -20 dBm for FInterferer > 2700 MHz and FInterferer < 4800 MHz.  NOTE 6: The power level of the interferer (PInterferer) for Range 3 shall be modified to -20 dBm for FInterferer > 2580 MHz and FInterferer < 2775 MHz.  NOTE 7 For UE supporting both bands 25 and 70, the FDL\_high of band 70 is applied as FDL\_high for band 25, and the FDL\_low of band 25 is applied as FDL\_low for band 70.  NOTE8: For bands 91 and 93 the FDL\_high of bands 92 and 94 are applied as FDL\_high for bands 91 and 93. For bands 92 and 94, the FDL\_low of bands 91 and 93 are applied as FDL\_low for bands 92 and 94 | | | | | |

For interferer frequencies across ranges 1, 2 and 3 in Table 7.6.3-2, a maximum of



exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a step size of MHz withthe number of resource blocks in the downlink transmission bandwidth configuration, BWChannelthe bandwidth of the frequency channel in MHz and *n* = 1, 2, 3 for SCS = 15, 30, 60 kHz, respectively. For these exceptions, the requirements in clause 7.7 apply.

For NR bands with FDL\_low ≥ 3300 MHz and FUL\_low ≥ 3300 MHz out-of-band band blocking is defined for an unwanted CW interfering signal falling outside a frequency range up to 3\*BWChannel below or from 3\*BWChannel above the UE receive band, where BWChannel is the channel bandwidth. The throughput of the wanted signal shall be ≥ 95 % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, 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 7.6.3-3 and Table 7.6.3-4. The relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal.

Table 7.6.3-3: Out-of-band blocking parameters for NR bands with FDL\_low ≥ 3300 MHz and FUL\_low ≥ 3300 MHz

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| RX parameter | Units | Channel bandwidth | | | | |
|  |  | 10 MHz | 15 MHz | 20 MHz | 25 MHz | 30 MHz |
| Power in transmission bandwidth configuration | dBm | REFSENS + channel bandwidth specific value below | | | | |
|  | dB | 6 | 7 | 9 | 9 | 9 |
| RX parameter | Units | Channel bandwidth | | | | |
|  |  | 40 MHz | 50 MHz | 60 MHz | 70 MHz | 80 MHz |
| Power in transmission bandwidth configuration | dBm | REFSENS + channel bandwidth specific value below | | | | |
|  | dB | 9 | 9 | 9 | 9 | 9 |
| RX parameter | Units | Channel bandwidth | | | | |
|  |  | 90 MHz | 100 MHz |  |  |  |
| Power in transmission bandwidth configuration | dBm | REFSENS + channel bandwidth specific value below | |  |  |  |
|  | dB | 9 | 9 |  |  |  |
| NOTE: The transmitter shall be set to 4 dB below PCMAX\_L,f,c at the minimum UL configuration specified in Table 7.3.2-3 with PCMAX\_L,f,c defined in clause 6.2.4. | | | | | | |

Table 7.6.3-4: Out of-band blocking for NR bands with FDL\_low ≥ 3300 MHz and FUL\_low ≥ 3300 MHz

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| NR band | Parameter | Unit | Range1 | Range 2 | Range 3 |
| n77, n78 (NOTE 3) | Pinterferer | dBm | -44 | -30 | -15 |
|  | Finterferer (CW) | MHz | -60 < f – FDL\_low ≤ -3\*BWChannel  or  3\*BWChannel ≤ f – FDL\_high < 60 | -200 < f – FDL\_low ≤ -MAX(60,3\*BWChannel)  or  MAX(60,3\*BWChannel) ≤ f – FDL\_high < 200 | 1 ≤ f ≤ FDL\_low – MAX(200,3\*BWChannel)  or  FDL\_high + MAX(200,3\*BWChannel)  ≤ f ≤ 12750 |
| n79 (NOTE 4) | Finterferer (CW) | MHz | N/A | -150 < f – FDL\_low ≤ -MAX(60,3\*BWChannel)  or  MAX(60,3\*BWChannel) ≤ f – FDL\_high < 150 | 1 ≤ f ≤ FDL\_low – MAX(150,3\*BWChannel)  or  FDL\_high + MAX(150,3\*BWChannel)  ≤ f ≤ 12750 |
| NOTE 1: The power level of the interferer (PInterferer) for Range 3 shall be modified to -20 dBm for FInterferer > 6000 MHz.  NOTE 2: BWChannel denotes the channel bandwidth of the wanted signal  NOTE 3: The power level of the interferer (PInterferer) for Range 3 shall be modified to -20 dBm, for FInterferer > 2700 MHz and FInterferer < 4800 MHz. For BWChannel > 15 MHz, the requirement for Range 1 is not applicable and Range 2 applies from the frequency offset of 3\*BWChannel from the band edge. For BWChannel > 60 MHz, the requirement for Range 2 is not applicable and Range 3 applies from the frequency offset of 3\*BWChannel from the band edge.  NOTE 4: The power level of the interferer (PInterferer) for Range 3 shall be modified to -20 dBm, for FInterferer > 3650 MHz and FInterferer < 5750 MHz. For BWChannel > 40 MHz, the requirement for Range 2 is not applicable and Range 3 applies from the frequency offset of 3\*BWChannel from the band edge. | | | | | |

For interferer frequencies across ranges 1, 2 and 3 in Table 7.6.3-4, a maximum of



exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a step size of MHz withthe number of resource blocks in the downlink transmission bandwidth configuration, BWChannel the bandwidth of the frequency channel in MHz and *n* = 1, 2, 3 for SCS = 15, 30, 60 kHz, respectively. For these exceptions, the requirements in clause 7.7 apply.

#### 7.6A.3.1 Out-of-band blocking for Intra-band contiguous CA

For intra-band contiguous carrier aggreagation the downlink SCC(s) shall be configured at nominal channel spacing to the PCC. For FDD, the PCC shall be configured closest to the uplink band. All downlink carriers shall be active throughout the test.

The UE shall fulfil the minimum requirement in presence of an interfering signal specified in Table 7.6A.3-1 and Table 7.6A.3-2 being on either side of the aggregated signal. The throughput of each carrier shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, 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).

Table 7.6A.3-1: Out-of-band blocking parameters for intra-band contiguous CA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| RX parameter | Units | CA bandwidth class | | | |
|  |  | B | C | D |  |
| Power in transmission bandwidth configuration | dBm | REFSENS + CA bandwidth class specific value below | | | |
|  | dB | 9 | 9 | 9 |  |
| NOTE 1: The transmitter shall be set to 4 dB below PCMAX\_L,f,c at the minimum UL configuration specified in Table 7.3.2-3 with PCMAX\_L,f,c defined in clause 6.2.4. | | | | | |

Table 7.6A.3-1a: Void

Table 7.6A.3-2: Out of-band blocking for intra-band contiguous CA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| NR band | Parameter | Unit | Range1 | Range 2 | Range 3 |
|  | Pinterferer | dBm | -45 | -30 | -15 |
| n41,n66,n71,n485,n40 | Finterferer (CW) | MHz | -60 < f – FDL\_low < -15  or  15 < f – FDL\_high < 60 | -85 < f – FDL\_low ≤ -60  or  60 ≤ f – FDL\_high < 85 | 1 ≤ f ≤ FDL\_low – 85  or  FDL\_high + 85 ≤ f  ≤ 12750 |
| n77, n78  (NOTE 3) | Finterferer (CW) | MHz | N/A | N/A | 1 ≤ f ≤ FDL\_low – MAX(200,3\*BWChannel\_CA)  or  FDL\_high+ MAX(200,3\*BWChannel\_CA)  ≤ f ≤ 12750 |
| n79  (NOTE 4) | Finterferer (CW) | MHz | N/A | N/A | 1 ≤ f ≤ FDL\_low – MAX(150,3\*BWChannel\_CA)  or  FDL\_high + MAX(150,3\*BWChannel\_CA)  ≤ f ≤ 12750 |
| NOTE 1: The power level of the interferer (PInterferer) for Range 3 shall be modified to -20 dBm for FInterferer > 6000 MHz.  NOTE 2: BWChannel\_CA denotes the aggregated channel bandwidth of the wanted signal  NOTE 3: The power level of the interferer (PInterferer) for Range 3 shall be modified to -20 dBm, for FInterferer > 2700 MHz and FInterferer < 4800 MHz. For BWChannel\_CA > 15 MHz, the requirement for Range 1 is not applicable and Range 2 applies from the frequency offset of 3\*BWChannel\_CA from the band edge. For BWChannel\_CA > 60 MHz, the requirement for Range 2 is not applicable and Range 3 applies from the frequency offset of 3\*BWChannel\_CA from the band edge.  NOTE 4: The power level of the interferer (PInterferer) for Range 3 shall be modified to -20 dBm, for FInterferer > 3650 MHz and FInterferer < 5750 MHz. For BWChannel\_CA > 40 MHz, the requirement for Range 2 is not applicable and Range 3 applies from the frequency offset of 3\*BWChannel\_CA from the band edge.  NOTE 5: The power level of the interferer (PInterferer) for Range 3 shall be modified to -20 dBm for FInterferer > 2700 MHz and FInterferer < 4800 MHz | | | | | |

Table 7.6A.3-2a: Void

For interferer frequencies across ranges 1, 2 and 3 in Table 7.6A.3-2, a maximum of



exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a step size of MHz with  the number of resource blocks in the downlink transmission bandwidth configuration, BWChannel is the bandwidth of the frequency channel in MHz and *n* = 1, 2, 3 for SCS = 15, 30, 60 kHz, respectively. For these exceptions, the requirements in subclause 7.7A.1 apply.

## ***<Next change>***

## 7.6F Blocking characteristics

### 7.6F.2 In-band blocking

#### 7.6F.2.1 General

In-band blocking (IBB) is defined for an unwanted interfering signal falling into the UE receive band or into the first 60 MHz below or above the UE receive band. The throughput of the wanted signal shall be ≥ 95 % of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, 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 7.6F.2.1-1 and Table 7.6F.2.1-2. The relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal.

### 7.6F.3 Out-of-band blocking

#### 7.6F.3.1 General

Out-of-band band blocking is defined for an unwanted CW interfering signal falling outside a frequency range 60 MHz or greater below or above the UE receive band. The throughput of the wanted signal shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, 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 7.6F.3.1-1 and Table 7.6F.3.1-2. The relative throughput requirement shall be met for any SCS specified for the channel bandwidth of the wanted signal.

## ***<Next change>***

## 7.7B Spurious response for NR-DC

For inter-band NR-DC configurations, the spurious response for the corresponding inter-band CA configuration as specified in clause 7.7A applies.

## ***<Next change>***

## 7.8E Intermodulation characteristics for V2X

### 7.8E.2 Wide band Intermodulation

#### 7.8E.2.2 Wide band Intermodulation for V2X con-current operation

For the inter-band con-current NR V2X operation, the requirements specified in clause 7.8E.2.1 shall apply for the NR sidelink reception in the operating Bands in Table 5.2E.1-1 and the requirements specified in clause 7.8 shall apply for the NR downlink reception in licensed band while all downlink carriers are active.

For the intra-band con-current NR V2X operation, the SL carrier is configured with nominal channel spacing to the NR downlink carrier. The minimum requirement specified in clause 7.8A.2.1 shall be applied to the corresponding intra-band con-current V2X UE.

## ***<Next change>***

# Annex G (normative):

Difference of relative phase and power errors

# G.0 General

This annex gives further information needed for understanding and implementing 6.4D.4. The following terms should be understood as follows:

* Relative phase error: refers to the phase difference between signals at different antenna connectors, which should be ideally 0. It should be understood as for a slot i.e. (slot) relative phase. It is calculated based on DMRS symbols of that slot or on SRS symbols.
* Difference of relative phase error: refers to the difference between the relative phase error determined per slot and the relative phase error determined based on the SRS transmitted.

# G.1 Measurement Point

Figure G.1-1 shows the measurement point for the difference of relative phase and power errors.



Figure G.1-1 - Measurement point for difference of relative phase/power error for UL coherent MIMO

# G.2 Relative Phase Error Measurement

Here are listed the different aspects that may lead to different interpretations.

## G.2.1. Symbols used

Phase error is determined based on DMRS REs (3 DMRS symbols per slot).

## G.2.2. CFO (carrier frequency offset) correction

The TE performs a CFO correction on a slot-by-slot basis using a common frequency correction at the two uplink antenna connectors.

## G.2.3. Steps of the measurement method

Below are detailed the steps necessary to obtain the maximum difference of relative phase error during the 20ms time window.

1. Determination for each subcarrier and at each antenna, the SRS relative phase error based on the last SRS transmitted on Ant1 and Ant2, that relative phase error serves as a reference for the calculation of the difference of relative phase error for each slot inside the 20 ms time window.

* The output is the “SRS relative phase error” vector for the last SRS transmitted: .

1. Calculation for the last SRS transmitted, for each RB of the SRS relative phase errors based on the arithmetic mean of the subcarrier SRS relative phase errors determined in previous step.
   * The output is the “SRS relative phase error” vector for the last SRS transmitted: .
2. CFO correction on slot-by-slot basis using a common frequency correction for both antenna outputs.
3. Determination for each subcarrier and at each antenna, the phase over the slot being analyzed. The phase is extracted from the channel estimate derived from the 3 DMRS symbols of the slot using the LSE technique.

* The output is one vector of dimension for each antenna.

1. Calculation for a slot for each subcarrier of the relative phase error (difference between the vectors determined in the previous step).

* The output is subcarrier relative phase errors of a slot: .

1. Calculation for a slot, for each RB of the relative phase errors based on the arithmetic mean of the subcarrier relative phase errors determined in previous step.

* The output is a “slot relative phase error” vector for a slot:.

1. Calculation for a slot of the difference of relative phase errors based on the “SRS relative phase error” (reference) determined in step 2 and the “slot relative phase error” determined in previous step.

* The output is a “difference of relative phase error” vector for a slot:.

1. Calculation for a slot of the arithmetic mean value of the “difference of relative phase error” vector determined in previous step, this value corresponds to an RB.

* The output is a “difference of relative phase error” value for a slot:

1. Perform for each slot of the 20ms time window, steps 3 to 8.

* The output is a “difference of relative phase error” vector: .

1. Calculation of the maximum value of the “difference of relative phase error”.

* The output is the “difference of relative phase error” that should be verified as complying with the 40° maximum allowable difference of relative phase error requirement: .

## ***<End of change>***