**3GPP TSG-RAN WG4 Meeting #116 revR4-2509391**

**Bengaluru, India, August 25th – 29th, 2025**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | 38.101-1 | **CR** | Draft CR | **rev** | - | **Current version:** | 19.2.0 |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME | **x** | Radio Access Network |  | Core Network |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | Introduction of PC1.5 contiguous intra-band UL CA | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Skyworks Solutions Inc., Samsung, T-Mobile USA, OPPO, Verizon, LG, Huawei, ZTE. | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | [NR\_ENDC\_RF\_Ph4\_Core](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_114/Inbox/Drafts/%5b114%5d%5b117%5d%20NR_ENDC_RF_Ph4_part2) | | | | |  | ***Date:*** | | | 2025-04-08 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | B |  | | | | | ***Release:*** | | | Rel-19 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Introduction of PC1.5 contiguous intra-band UL CA according to the agreements in RAN4 discussion. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | The followings are the summary of changes based on RAN4 agreements.   1. Added example Band combinations in clause 5 and 6: CA\_n41C, CA\_n78C, CA\_n77C and CA\_n79C (WID RP-251816) 2. Assumed architecture: 2Tx architecture with TxD and UL MIMO (WF R4-2410565 and R4-2414277) 3. MOP tolerance: +2/-3 dB (WF R4-2410565) 4. Pcmax tolerance: +2/-3 dB (WF R4-2410565) 5. The upper bound of Pcmax is 29 dBm (WF R4-2414277) 6. PSD: The MPR requirements defined are carrier power and are PSD balance/imbalance agnostic. The MPR values are derived with equal PSD condition with margin reserved to accommodate unequal PSD cases. (WF R4-2502863) 7. ACLR: NR ACLR as 31dB, UTRA ALCR not needed for the example combos 8. SAR solution: Duty cycle solution is considered (WF R4-2410565) 9. Define separate MPR/A-MPR requirements for handheld UE and large FWA form factor respectively (WF R4-2410565) 10. MRP/A-MPR requirements: As agreed in WF R4-2505100, R4-2507934. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | PC1.5 contiguous intra-band UL CA is not introduced in R-19 | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 5.5A.1, 6.2A.1.1, 6.2A2.1, 6.2A.3.1.1, 6.2A4.1.1, 6.2H.1, 6.5A.2.4.1.1 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*Beginning of changes 1 \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

### 5.5A.1 Configurations for intra-band contiguous CA

Table 5.5A.1-1: NR CA configurations and bandwidth combination sets defined for  
intra-band contiguous CA

| NR CA configuration / Bandwidth combination set | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configurations or single uplink carrier5 | Channel bandwidths for carrier (MHz) | Channel bandwidths for carrier (MHz) | Channel bandwidths for carrier (MHz) | Channel bandwidths for carrier (MHz) | Channel bandwidths for carrier (MHz) | Maximum aggregated  bandwidth (MHz) | Bandwidth combination set |
| CA\_n1B | - | 10 | 10,15 |  |  |  | 40 | 0 |
|  |  | 15 | 15,20 |  |  |  |  |  |
|  |  | 20 | 20 |  |  |  |  |  |
| CA\_n2B | - | 5 | 15 |  |  |  | 20 | 0 |
|  |  | 10 | 10 |  |  |  |  |  |
| CA\_n3B | - | 5 | 15, 20, 25, 30 |  |  |  | 60 | 0 |
|  |  | 10 | 10, 15, 20, 25, 30 |  |  |  |  |  |
|  |  | 15, 20, 25, 30 | 5, 10, 15, 20, 25, 30 |  |  |  |  |  |
|  | CA\_n3B | 5, 10, 15, 20 | 5, 10, 15, 20 |  |  |  | 40 | 1 |
|  | - | See n3 channel bandwidths in Table 5.3.5-1 for each carrier2 | |  |  |  | 75 | 4 and 5 |
| CA\_n5B | CA\_n5B | 5, 10, 15 | 5, 10, 15 |  |  |  | 20 | 0 |
|  |  | 5, 10, 15, 20 | 5, 10, 15, 20 |  |  |  | 25 | 1 |
|  |  | See n5 channel bandwidths in Table 5.3.5-1 for each carrier2 | |  |  |  | 25 | 4 and 5 |
| CA\_n7B | CA\_n7B | 10 | 10, 15, 20, 30, 40 |  |  |  | 50 | 0 |
|  |  | 15 | 15, 20, 30 |  |  |  |  |  |
|  |  | 20 | 20, 30 |  |  |  |  |  |
|  | - | See n7 channel bandwidths in Table 5.3.5-1 for each carrier2 | |  |  |  | 70 | 4 and 5 |
| CA\_n25B | - | 5 | 15 |  |  |  | 20 | 0 |
|  |  | 10 | 10 |  |  |  |  |  |
| CA\_n38B | - | 5 | 15, 20, 25 |  |  |  | 50 | 0 |
|  |  | 10 | 10, 15, 20, 25 |  |  |  |  |  |
|  |  | 15, 20, 25 | 5, 10, 15, 20, 25 |  |  |  |  |  |
| CA\_n40B | - | 20 | 80 |  |  |  | 100 | 0 |
|  |  | 50 | 50 |  |  |  |  |  |
|  | n403,4  CA\_n40B3 | 10,15, 20, 30, 40, 50, 60, 80 | 10, 15, 20, 30, 40, 50, 60, 80 |  |  |  | 100 | 1 |
|  |  | See n40 channel bandwidths in Table 5.3.5-1 for each carrier2 | |  |  |  | 100 | 4 and 5 |
| CA\_n41B | n413,4  CA\_n41B3 | 10, 20, 30, 40, 50 | 10, 20, 30, 40, 50 |  |  |  | 100 | 0 |
|  |  | See n41 channel bandwidths in Table 5.3.5-1 for each carrier2 | |  |  |  | 100 | 4 and 5 |
| CA\_n41C | n413,4  CA\_n41C3,4 | 40 | 80, 100 |  |  |  | 180 | 0 |
|  |  | 50, 60, 80 | 60, 80, 100 |  |  |  |  |  |
|  |  | 10 | 100 |  |  |  | 190 | 1 |
|  |  | 15, 20 | 90, 100 |  |  |  |  |  |
|  |  | 40 | 80, 90, 100 |  |  |  |  |  |
|  |  | 50, 60, 80, 90 | 60, 80, 90, 100 |  |  |  |  |  |
|  |  | 10 | 100 |  |  |  | 190 | 2 |
|  |  | 15, 20 | 90, 100 |  |  |  |  |  |
|  |  | 30, 40 | 80, 90, 100 |  |  |  |  |  |
|  |  | 50, 60, 80, 90 | 60, 80, 90, 100 |  |  |  |  |  |
|  |  | See n41 channel bandwidths in Table 5.3.5-1 for each carrier2 | |  |  |  | 190 | 4 and 5 |
| CA\_n46B | - | 20, 40, 60 | 20, 40 |  |  |  | 100 | 0 |
| CA\_n46C | - | 60, 80 | 60, 80 |  |  |  | 160 | 0 |
| CA\_n46D | - | 60, 80 | 80 | 80 |  |  | 240 | 0 |
| CA\_n46M | - | 20, 40, 60 | 20, 40 | 20, 40 |  |  | 140 | 0 |
| CA\_n46N | - | Void |  |  |  |  |  | 0 |
|  |  | 20, 40, 60 | 20, 40 | 20, 40 | 20, 40 |  | 180 | 1 |
| CA\_n46O | - | 20, 60 | 20, 40 | 20, 40 | 20, 40 | 20, 40 | 220 | 0 |
| CA\_n48B | CA\_n48B | 5 | 15, 20 |  |  |  | 40 | 0 |
|  |  | 10, 15, 20 | 10, 15, 20 |  |  |  |  |  |
|  |  | 15, 20 | 15, 20 |  |  |  |  |  |
|  | - | 10 | 50, 60, 80, 90 |  |  |  | 100 | 1 |
|  |  | 15, 20 | 40, 50, 60, 80 |  |  |  |  |  |
|  |  | 40 | 40, 50, 60 |  |  |  |  |  |
|  | - | 10, 15, 20, 30, 40 | 10, 15, 20, 30, 40, 50, 60, 70, 80, 90 |  |  |  | 100 | 2 |
|  | - | See n48 channel bandwidths in Table 5.3.5-1 for each carrier2 | |  |  |  | 100 | 4 and 5 |
| CA\_n48C | - | 10 | 100 |  |  |  | 140 | 0 |
|  |  | 15 | 90, 100 |  |  |  |  |  |
|  |  | 20 | 90, 100 |  |  |  |  |  |
|  |  | 40 | 80, 90, 100 |  |  |  |  |  |
|  | - | 10, 15, 20, 30, 40 | 70, 80, 90, 100 |  |  |  | 140 | 1 |
|  | - | See n48 channel bandwidths in Table 5.3.5-1 for each carrier2 | |  |  |  | 140 | 4 and 5 |
| CA\_n66B | - | 5 | 20, 40 |  |  |  | 50 | 0 |
|  |  | 10 | 15, 20, 40 |  |  |  |  |  |
|  |  | 15 | 15, 20 |  |  |  |  |  |
| CA\_n71B | n713 | 5 | 20 |  |  |  | 25 | 0 |
|  |  | 10 | 15 |  |  |  |  |  |
|  |  | 10 | 20 |  |  |  | 35 | 1 |
|  |  | 15 | 15, 20 |  |  |  |  |  |
|  |  | 5, 10, 15 | 15, 20 |  |  |  | 35 | 2 |
|  |  | See n71 channel bandwidths in Table 5.3.5-1 for each carrier2 | |  |  |  | 35 | 4 and 5 |
| CA\_n77B | n773 | 20 | 25, 30, 40 |  |  |  | 60 | 0 |
|  |  | 25 | 30 |  |  |  |  |  |
|  |  | See n77 channel bandwidths in Table 5.3.5-1 for each carrier2 | |  |  |  | 100 | 4 and 5 |
| CA\_n77C | n773,4  CA\_n77C3,4 | 50 | 60, 80, 100 |  |  |  | 200 | 0 |
|  |  | 60 | 60, 80, 100 |  |  |  |  |  |
|  |  | 80 | 80, 100 |  |  |  |  |  |
|  |  | 100 | 100 |  |  |  |  |  |
|  |  | 10 | 100 |  |  |  | 200 | 1 |
|  |  | 15, 20 | 90, 100 |  |  |  |  |  |
|  |  | 25, 30 | 80, 90, 100 |  |  |  |  |  |
|  |  | 40 | 70, 80, 90, 100 |  |  |  |  |  |
|  |  | 50, 60, 70, 80, 90, 100 | 60, 70, 80, 90, 100 |  |  |  |  |  |
|  |  | See n77 channel bandwidths in Table 5.3.5-1 for each carrier2 | |  |  |  | 200 | 4 and 5 |
| CA\_n77D | n773 | 100 | 100 | 100 |  |  | 300 | 0 |
|  |  | See n77 channel bandwidths in Table 5.3.5-1 for each carrier2 | | |  |  | 300 | 4 and 5 |
| CA\_n78B | n783 | 20 | 50 |  |  |  | 70 | 0 |
| CA\_n78C | n783,4  CA\_n78C3,4 | 50 | 60, 80, 100 |  |  |  | 200 | 0 |
|  |  | 60 | 60, 80, 100 |  |  |  |  |  |
|  |  | 80 | 80, 100 |  |  |  |  |  |
|  |  | 100 | 100 |  |  |  |  |  |
|  |  | 10 | 100 |  |  |  | 200 | 1 |
|  |  | 15, 20 | 90, 100 |  |  |  |  |  |
|  |  | 25, 30 | 80, 90, 100 |  |  |  |  |  |
|  |  | 40 | 70, 80, 90, 100 |  |  |  |  |  |
|  |  | 50, 60, 70, 80, 90, 100 | 60, 70, 80, 90, 100 |  |  |  |  |  |
|  |  | See n78 channel bandwidths in Table 5.3.5-1 for each carrier2 | |  |  |  | 200 | 4 and 5 |
| CA\_n78D | n783 | 100 | 100 | 100 |  |  | 300 | 0 |
|  |  | See n78 channel bandwidths in Table 5.3.5-1 for each carrier2 | | |  |  | 300 | 4 and 5 |
| CA\_n79C | CA\_n79C3,4 | 50 | 60, 80, 100 |  |  |  | 200 | 0 |
|  |  | 60 | 60, 80, 100 |  |  |  |  |  |
|  |  | 80 | 80, 100 |  |  |  |  |  |
|  |  | 100 | 100 |  |  |  |  |  |
|  |  | See n79 channel bandwidths in Table 5.3.5-1 for each carrier2 | |  |  |  | 200 | 4 and 5 |
| CA\_n79D | - | 100 | 100 | 100 |  |  | 300 | 0 |
|  |  | See n79 channel bandwidths in Table 5.3.5-1 for each carrier2 | | |  |  | 300 | 4 and 5 |
| CA\_n96B | CA\_n96B | 20, 40 | 20, 40, 60, 80 |  |  |  | 100 | 0 |
| CA\_n96C | CA\_n96C | 80 | 40, 60, 80 |  |  |  | 160 | 0 |
| CA\_n96D | - | 80 | 80 | 60, 80 |  |  | 240 | 0 |
| CA\_n96E | - | 80 | 80 | 80 | 80 |  | 320 | 0 |
| CA\_n102B | CA\_n102B | 20, 40 | 20, 40, 60, 80 |  |  |  | 100 | 0 |
| CA\_n102C | CA\_n102C | 80 | 40, 60, 80 |  |  |  | 160 | 0 |
| CA\_n102D | - | 80 | 80 | 60, 80 |  |  | 240 | 0 |
| CA\_n102E | - | 80 | 80 | 80 | 80 |  | 320 | 0 |
| CA\_n104C | CA\_n104C | 20, 30, 40, 50 | 60, 70, 80, 90, 100 |  |  |  | 200 | 0 |
|  |  | 60, 70, 80, 90 | 60, 70, 80, 90, 100 |  |  |  |  |  |
|  |  | 100 | 100 |  |  |  |  |  |
|  |  | See n104 channel bandwidths in Table 5.3.5-1 for each carrier | |  |  |  | 200 | 4 and 5 |
| CA\_n104D | - | See n104 channel bandwidths in Table 5.3.5-1 for each carrier | | |  |  | 300 | 4 and 5 |
| NOTE 1: For each channel bandwidth of each component carrier, refer to Table 5.3.5-1 for the applicable SCSs. For a given band, not all UE channel bandwidths support the same SCSs.  NOTE 2: The aggregated bandwidth must be greater than or equal to the minimum for the bandwidth class defined in Table 5.3A.5-1, and smaller than or equal to the maximum aggregated bandwidth.  NOTE 3: Minimum requirements for Power Class 2 are applicable for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 4: Minimum requirements for Power Class 1.5 are applicable for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 5: Only single uplink carriers with power class other than PC3 are listed. | | | | | | | | |

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*End of changes 1 \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*Beginning of changes 2 \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

#### 6.2A.1.1 UE maximum output power for Intra-band contiguous CA

For uplink intra-band contiguous carrier aggregation, the maximum output power is specified in Table 6.2A.1.1-1. For downlink intra-band contiguous carrier aggregation with a single uplink component carrier configured in the NR band, the maximum output power is specified in Table 6.2.1-1 for power class 3 and other power classes if indicated in clause 5.5A.1.

Table 6.2A.1.1-1: UE Power Class for intra-band contiguous CA

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR CA Configuration | Class 1.5 (dBm) | Tolerance (dB) | Class 2 (dBm) | Tolerance (dB) | Class 3 (dBm) | Tolerance (dB) | Class 5 (dBm) | Tolerance (dB) |
| CA\_n3B |  |  |  |  | 23 | +2/-2 |  |  |
| CA\_n5B |  |  |  |  | 23 | +2/-2 |  |  |
| CA\_n7B |  |  |  |  | 23 | +2/-2 |  |  |
| CA\_n40B |  |  | 26 | +2/-3 | 23 | +2/-2 |  |  |
| CA\_n41B |  |  | 26 | +2/-3 | 23 | +2/-2 |  |  |
| CA\_n41C | 295 | +2/-3 | 26 | +2/-3 | 23 | +2/-2 |  |  |
| CA\_n48B |  |  |  |  | 23 | +2/-3 |  |  |
| CA\_n77C | 295 | +2/-3 | 26 | +2/-3 | 23 | +2/-3 |  |  |
| CA\_n78C | 295 | +2/-3 | 26 | +2/-3 | 23 | +2/-3 |  |  |
| CA\_n79C | 295 | +2/-3 | 26 | +2/-3 | 23 | +2/-3 |  |  |
| CA\_n104C |  |  |  |  | 23 | +2/-3 |  |  |
| NOTE 1: An uplink CA configuration in which the band has NOTE 3 in Table 6.2.1-1 is allowed to reduce the lower tolerance limit by 1.5 dB when the transmission bandwidths of the band are confined within FUL\_low and FUL\_low + 4 MHz or FUL\_high - 4 MHz and FUL\_high.  NOTE 2: PPowerClass is the maximum UE power specified without taking into account the tolerance.  NOTE 3: For intra-band contiguous carrier aggregation the maximum power requirement shall apply to the total transmitted power over all component carriers (per UE).  NOTE 4: Power class 3 is the default power class unless otherwise stated.  NOTE 5: Applies to UE indicating TxDsupported | | | | | | | | |

If a UE supports power class 2 than the default UE power class for the band combination listed in Table 6.2A.1.1-1 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 total uplink symbols transmitted on all UL CCs 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 total uplink symbols transmitted on all UL CCs in a certain evaluation period is larger than *maxUplinkDutyCycle-PC2-FR1* as defined in TS 38.306 (The exact evaluation period is no less than one radio frame); or

- if 10 log10 ∑ pEMAX,c or PEMAX,CA which defined in clause 6.2A.4.1.1 is 23dBm 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 6.2A.4.1.1;

- else

- shall apply all requirements for the supported power class and set the configured transmitted power as specified in clause 6.2A.4.1.1.

If a UE supports power class 1.5 for the band combination listed in Table 6.2A.1.1-1 and the supported power class enables the higher maximum output power than that of the power class 2:

- if the field of UE capability *maxUplinkDutyCycle-PC2-FR1* is absent and the field of UE capability *maxUplinkDutyCycle-PC1dot5-MPE-FR1* is absent and the percentage of total uplink symbols transmitted on all UL CCs 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 total uplink symbols transmitted on all UL CCs in a certain evaluation period is larger than *maxUplinkDutyCycle-PC2-FR1* as defined in TS 38.306 (The exact evaluation period is no less than one radio frame); or

- if the field of UE capability *maxUplinkDutyCycle-PC1dot5-MPE-FR1* is not absent and the percentage of total uplink symbols transmitted on all UL CCs in a certain evaluation period is larger than *2\*maxUplinkDutyCycle-PC1dot5-MPE-FR1* as defined in TS 38.306 (The exact evaluation period is no less than one radio frame); or

- if 10 log10 ∑ pEMAX,c or PEMAX,CA which defined in 6.2A.4.1.1 is 23dBm or lower;

- shall apply all requirements for the default power class to the supported power class and set the configured transmitted power as 6.2A.4.1.1.

- if the field of UE capability *maxUplinkDutyCycle-PC2-FR1* is absent and the field of UE capability *maxUplinkDutyCycle-PC1dot5-MPE-FR1* is absent and the percentage of total uplink symbols transmitted on all UL CCs in a certain evaluation period is larger than 25% but less than or equal to 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 total uplink symbols transmitted on all UL CCs in a certain evaluation period is larger than 0.5\**maxUplinkDutyCycle-PC2-FR1* but less than or equal to *maxUplinkDutyCycle-PC2-FR1* as defined in TS 38.306 (The exact evaluation period is no less than one radio frame); or

- if the field of UE capability *maxUplinkDutyCycle-PC1dot5-MPE-FR1* is not absent and the percentage of total uplink symbols transmitted on all UL CCs in a certain evaluation period is larger than *maxUplinkDutyCycle-PC1dot5-MPE-FR1* but less than or equal to *2\*maxUplinkDutyCycle-PC1dot5-MPE-FR1* as defined in TS 38.306 (The exact evaluation period is no less than one radio frame); or

- if 10 log10 ∑ pEMAX,c or PEMAX,CA which defined in clause 6.2A.4.1.1 is between 23dBm and 26dBm;

- shall apply all requirements for the power class 2 to the supported power class and set the configured transmitted power as specified in clause 6.2A.4.1.1.

- else

- shall apply all requirements for the power class 1.5 to the supported power class and set the configured transmitted power as 6.2A.4.1.1.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*End of changes 2 \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*Beginning of changes 3 \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

#### 6.2A.2.1 UE maximum output power reduction for Intra-band contiguous CA

For intra-band contiguous carrier aggregation the allowed Maximum Power Reduction (MPR) for the maximum output power in 6.2A.1.1-1 with contiguous RB allocation is specified in Table 6.2A.2.1-1 for UE power class 3 CA bandwidth classes B and C. The MPR with contiguous RB allocation is specified in Table 6.2A.2.1-1a for power class 2 CA bandwidth classes B and C when the signalling is absent for *dualPA-Architecture* IE, and for power class 2 CA bandwidth class C when the signalling is indicated for *dualPA-Architecture* IE. The MPR with contiguous RB allocation is specified in Table 6.2A.2.1-1b for power class 2 CA bandwidth classes B and C with TxD supported. The MPR with contiguous RB allocation is specified in Table 6.2A.2.1-1c and 6.2A.2.1-1d for 2Tx power class 1.5 CA bandwidth class C for hand-held UE and large FWA form factor respectively.

In case the modulation format or waveform type is different on different component carriers then the requirement is set by rules applied to the waveform type (DFT-s-OFDM or CP-OFDM) and modulation order used in the configuration with the largest MPR.

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

Table 6.2A.2.1-1: Contiguous RB allocation for Power Class 3

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Modulation | | MPR for bandwidth class B(dB) | | MPR for bandwidth class C(dB) | |
|  | | inner | outer | inner | outer |
| DFT-s-OFDM | Pi/2 BPSK | 1.0 | 3.5 | 2.5 | 7 |
|  | QPSK | 1.0 | 3.5 | 2.5 | 7 |
|  | 16QAM | 1.5 | 3.5 | 2.5 | 7 |
|  | 64QAM | 3.0 | 4.0 | 5 | 7 |
|  | 256QAM | 5.5 | 6.0 | 7 | 7.5 |
| CP-OFDM | QPSK | 2.0 | 4.0 | 3.5 | 8 |
|  | 16QAM | 2.5 | 4.0 | 3.5 | 8 |
|  | 64QAM | 3.5 | 4.0 | 5 | 8 |
|  | 256QAM | 6.5 | 6.5 | 7 | 8 |

Table 6.2A.2.1-1a: Contiguous RB allocation for Power Class 2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Modulation | | MPR for bandwidth class B(dB) | | MPR for bandwidth class C(dB) | |
|  | | inner | Outer1 | inner | outer |
| DFT-s-OFDM | Pi/2 BPSK | 2.0 | 4.01 | 2.5 | 7 |
|  | QPSK | 2.0 | 4.01 | 2.5 | 7 |
|  | 16QAM | 2.5 | 4.01 | 2.5 | 7 |
|  | 64QAM | 3.0 | 4.51 | 5 | 7 |
|  | 256QAM | 5.5 | 6.0 | 7 | 7.5 |
| CP-OFDM | QPSK | 2.5 | 5.01 | 3.5 | 8 |
|  | 16QAM | 3.0 | 5.01 | 3.5 | 8 |
|  | 64QAM | 3.5 | 5.01 | 5 | 8 |
|  | 256QAM | 6.5 | 6.5 | 7 | 8 |
| NOTE 1: When 1 RB or 2 RB are allocated at the lower edge of lowest CC or upper edge of upper CC, MPR for outer is 5.5 dB. | | | | | |

Table 6.2A.2.1-1b: Contiguous RB allocation for Power Class 2 with 2Tx2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Modulation | | MPR for bandwidth class B(dB) | | MPR for bandwidth class C(dB) | |
|  | | inner | Outer1 | inner | outer |
| DFT-s-OFDM | Pi/2 BPSK | 3.0 | 5.01 | 3.5 | 8 |
| QPSK | 3.0 | 5.01 | 3.5 | 8 |
| 16QAM | 3.5 | 5.01 | 3.5 | 8 |
| 64QAM | 4.0 | 5.51 | 6 | 8 |
| 256QAM | 6.5 | 7.0 | 8 | 8.5 |
| CP-OFDM | QPSK | 3.0 | 5.51 | 4.0 | 8.5 |
| 16QAM | 3.5 | 5.51 | 4.0 | 8.5 |
| 64QAM | 4.0 | 5.51 | 5.5 | 8.5 |
| 256QAM | 7.0 | 7.0 | 7.5 | 8.5 |
| NOTE 1: When 1 RB or 2 RB are allocated at the lower edge of lowest CC or upper edge of upper CC, MPR for outer is 5.5 dB.  NOTE 2: UE indicating TxDsupported | | | | | |

Table 6.2A.2.1-1c: Contiguous RB allocation for Power Class 1.5 with 2Tx1

|  |  |  |  |
| --- | --- | --- | --- |
| Modulation | | MPR for bandwidth class C(dB) | |
|  | | Inner | outer |
| DFT-s-OFDM | Pi/2 BPSK | 4.5 | 9 |
| QPSK | 4.5 | 9 |
| 16QAM | 4.5 | 8 |
| 64QAM | 7 | 9 |
| 256QAM | 9 | 9 |
| CP-OFDM | QPSK | 5.0 | 9.5 |
| 16QAM | 5.0 | 9.5 |
| 64QAM | 6.5 | 9.5 |
| 256QAM | 8.5 | 9.5 |
| NOTE 1: UE indicating TxDsupported | | | |

Table 6.2A.2.1-1d: Contiguous RB allocation for large FWA form factor Power Class 1.5 with 2Tx1

|  |  |  |  |
| --- | --- | --- | --- |
| Modulation | | MPR for bandwidth class C(dB) | |
|  | | Inner | outer |
| DFT-s-OFDM | Pi/2 BPSK | 4 | 8.5 |
| QPSK | 4 | 8.5 |
| 16QAM | 4 | 8.5 |
| 64QAM | 6.5 | 8.5 |
| 256QAM | 8.5 | 9 |
| CP-OFDM | QPSK | 4.5 | 9 |
| 16QAM | 4.5 | 9 |
| 64QAM | 6 | 9 |
| 256QAM | 8 | 9 |
| NOTE 1: UE indicating TxDsupported  NOTE 2: This table is targeted to large FWA form factor with 20 dB or above antenna isolation. | | | |

For CA bandwidth class B and bandwidth class C with contiguous RB allocation, the following parameters are defined to specify valid RB allocation ranges for Inner and Outer RB allocations:

An RB allocation is contiguous if LCRB1 = 0 or LCRB2 = 0 or (LCRB1 ≠ 0 and LCRB2 ≠ 0 and RBStart1 + LCRB1 = NRB1 andRBStart2 = 0), where RBStart1, LCRB1, and NRB1 are for CC1, RBStart2, LCRB2, and NRB2 are for CC2, CC1 is the component carrier with lower frequency.

In contiguous CA, a contiguous allocation is an inner allocation if

RBStart,Low ≤ RBStart\_CA ≤ RBStart,High,and NRB\_alloc ≤ ceil(NRB,agg /2),

where

RBStart,Low = max(1, floor(NRB\_alloc /2))

RBStart,High = NRB,agg – RBStart,Low – NRB,alloc,

with

NRB\_alloc= LCRB1 ∙ 2^µ1 + LCRB2 ∙ 2^µ2,

NRB,agg=NRB1∙2^µ1+ NRB2∙2^µ2.

If LCRB1 =0, RBStart\_CA = NRB1∙2^µ1+ RBStart2∙2^µ2,

if LCRB1 > 0, RBStart\_CA = RBStart1∙2^µ1.

A contiguous allocation that is not an Inner contiguous allocation is an Outer contiguous allocation.

For intra-band contiguous carrier aggregation the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2A.1.1-1 with non-contiguous RB allocation is specified in Table 6.2A.2.1-2 for UE power class 3 CA bandwidth classes B and C. The MPR with non-contiguous RB allocation is specified in Table 6.2A.2.1-3 for power class 2 CA bandwidth classes B and C when the signalling is absent for *dualPA-Architecture* IE, and for power class 2 CA bandwidth class C when the signalling is indicated for *dualPA-Architecture* IE. The MPR with non-contiguous RB allocation is specified in Table 6.2A.2.1-4 for power class 2 CA bandwidth classes B and C with TxD supported. The MPR with non-contiguous RB allocation is specified in Table 6.2A.2.1-5 and Table 6.2A.2.1-6 for 2Tx power class 1.5 for CA bandwidth class C for hand-held UE and large FWA form factor respectively.

Table 6.2A.2.1-2: non-contiguous RB allocation for Power Class 3

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Modulation | | MPR for bandwidth class B(dB) | | | MPR for bandwidth class C(dB) | | |
|  | | inner | Outer11 | Outer22 | inner | Outer11 | Outer22 |
| DFT-s-OFDM | Pi/2 BPSK | 2 | 5.5 | 11.5 | 2.5 | 6 | 13 |
|  | QPSK | 2 | 5.5 |  | 2.5 | 6 |  |
|  | 16QAM | 2.5 | 5.5 |  | 3 | 6 |  |
|  | 64QAM | 4.5 | 6 |  | 5 | 6 |  |
|  | 256QAM | 6 | 6.5 |  | 6.5 | 6.5 |  |
| CP-OFDM | QPSK | 2.5 | 6.5 | 12 | 3.5 | 7 | 14 |
|  | 16QAM | 3 | 7 |  | 3.5 | 7 |  |
|  | 64QAM | 5 | 7 |  | 5 | 7 |  |
|  | 256QAM | 7.5 | 7.5 |  | 7.5 | 7.5 |  |
| NOTE 1: Outer 1 MPR for Pi/2 BPSK and QPSK is reduced by 2dB for aggregated allocation bandwidth > 10MHz  NOTE 2: Outer 2 MPR is reduced by 4.5dB for aggregated allocation bandwidth > 10MHz | | | | | | | |

Table 6.2A.2.1-3: non-contiguous RB allocation for Power Class 2

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Modulation | | MPR for bandwidth class B(dB) | | | MPR for bandwidth class C(dB) | | |
|  | | inner | Outer12 | Outer23 | Inner | Outer12 | Outer23 |
| DFT-s-OFDM | Pi/2 BPSK | 31 | 6.5 | 13 | 31 | 7.5 | 13.5 |
|  | QPSK | 31 | 6.5 |  | 31 | 7.5 |  |
|  | 16QAM | 31 | 6.5 |  | 31 | 7.5 |  |
|  | 64QAM | 5 | 6.5 |  | 5 | 7.5 |  |
|  | 256QAM | 6.5 | 7 |  | 6.5 | 7.5 |  |
| CP-OFDM | QPSK | 3.51 | 7 | 14 | 3.51 | 8 | 14.5 |
|  | 16QAM | 3.51 | 7 |  | 3.51 | 8 |  |
|  | 64QAM | 5 | 7 |  | 5 | 8 |  |
|  | 256QAM | 7.5 | 7.5 |  | 7.5 | 8 |  |
| NOTE 1: the allowed MPR is [4] dB for aggregated allocation bandwidth < [2MHz].  NOTE 2: Outer 1 MPR for Pi/2 BPSK and QPSK is reduced by 2dB for aggregated allocation bandwidth > 10MHz  NOTE 3: Outer 2 MPR is reduced by 4.5dB for aggregated allocation bandwidth > 10MHz | | | | | | | |

Table 6.2A.2.1-4: non-contiguous RB allocation for Power Class 2 with 2Tx4

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Modulation | | MPR for bandwidth class B(dB) | | | MPR for bandwidth class C(dB) | | |
|  | | inner | Outer12 | Outer23 | Inner | Outer12 | Outer23 |
| DFT-s-OFDM | Pi/2 BPSK | 41 | 7.5 | 14 | 41 | 8.5 | 14.5 |
|  | QPSK | 41 | 7.5 |  | 41 | 8.5 |  |
|  | 16QAM | 41 | 7.5 |  | 41 | 8.5 |  |
|  | 64QAM | 6 | 7.5 |  | 6 | 8.5 |  |
|  | 256QAM | 7.5 | 8 |  | 7.5 | 8.5 |  |
| CP-OFDM | QPSK | 4.51 | 8 | 15 | 4.51 | 9 | 15.5 |
|  | 16QAM | 4.51 | 8 |  | 4.51 | 9 |  |
|  | 64QAM | 6 | 8 |  | 6 | 9 |  |
|  | 256QAM | 8.5 | 8.5 |  | 8.5 | 9 |  |
| NOTE 1: the allowed MPR is [4] dB for aggregated allocation bandwidth < [2MHz].  NOTE 2: Outer 1 MPR for Pi/2 BPSK and QPSK is reduced by 2dB for aggregated allocation bandwidth > 10MHz  NOTE 3: Outer 2 MPR is reduced by 4.5dB for aggregated allocation bandwidth > 10MHz  NOTE 4: UE indicating TxDsupported | | | | | | | |

Table 6.2A.2.1-5: non-contiguous RB allocation for Power Class 1.5 with 2Tx3

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Modulation | | MPR for bandwidth class C(dB) | | |
|  | | Inner | Outer11 | Outer22 |
| DFT-s-OFDM | Pi/2 BPSK | 5 | 9.5 | 16.5 |
|  | QPSK | 5 | 9.5 |  |
|  | 16QAM | 5 | 9.5 |  |
|  | 64QAM | 7 | 9.5 |  |
|  | 256QAM | 8.5 | 9.5 |  |
| CP-OFDM | QPSK | 5.5 | 10 | 17 |
|  | 16QAM | 5.5 | 10 |  |
|  | 64QAM | 7 | 10 |  |
|  | 256QAM | 9.5 | 10 |  |
| NOTE 1: Outer 1 MPR for Pi/2 BPSK and QPSK is reduced by 2dB for aggregated allocation bandwidth > 10MHz  NOTE 2: Outer 2 MPR is reduced by 4.5dB for aggregated allocation bandwidth > 10MHz  NOTE 3: UE indicating TxDsupported | | | | |

Table 6.2A.2.1-6: non-contiguous RB allocation for large FWA form factor Power Class 1.5 with 2Tx3

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Modulation | | MPR for bandwidth class C(dB) | | |
|  | | Inner | Outer11 | Outer22 |
| DFT-s-OFDM | Pi/2 BPSK | 4.5 | 9 | 16 |
|  | QPSK | 4.5 | 9 |  |
|  | 16QAM | 4.5 | 9 |  |
|  | 64QAM | 6.5 | 9 |  |
|  | 256QAM | 8 | 9 |  |
| CP-OFDM | QPSK | 5 | 9.5 | 16.5 |
|  | 16QAM | 5 | 9.5 |  |
|  | 64QAM | 6.5 | 9.5 |  |
|  | 256QAM | 9 | 9.5 |  |
| NOTE 1: Outer 1 MPR for Pi/2 BPSK and QPSK is reduced by 2dB for aggregated allocation bandwidth > 10MHz  NOTE 2: Outer 2 MPR is reduced by 4.5dB for aggregated allocation bandwidth > 10MHz  NOTE 3: UE indicating TxDsupported  NOTE 4: This table is targeted to large FWA form factor with 20 dB or above antenna isolation. | | | | |

For CA bandwidth classes B and C with non-contiguous RB allocation, the following parameters are defined to specify valid RB allocation ranges for Inner, Outer1 and Outer2 RB allocations:

Non-Contiguous RB allocation is defined as RBStart1 + LCRB1 < NRB1, orRBStart2 > 0, when both uplink CCs are activated and allocated with RB(s), where RBStart1, LCRB1, and NRB1 are for CC1, RBStart2, LCRB2, and NRB2 are for CC2, CC1 is the component carrier with lower frequency.

In contiguous CA, a non-contiguous RB allocation is a non-contiguous Inner RB allocation if the following conditions are met:

RBStart,Low ≤ RBStart\_CA ≤ RBStart,High and NRB\_alloc ≤ ceil((BWChannel\_CA / 3 – BWgap ) / 0.18MHz),

where

NRB\_alloc = (NRB1 - RBStart1)∙ 2^µ1 + (RBStart2 + LCRB2 ) ∙ 2^µ2,

RBStart\_CA = RBStart1∙2^μ1

RBStart,Low = max(1, floor(NRB\_alloc + (BWgap – BWGB,low)/0.18MHz))

RBStart,High = floor((BWChannel\_CA – 2 ∙ BWgap – BWGB,low)/0.18MHz – 2 ∙ NRB\_alloc)

BWGB,low =Foffset,low – (NRB1∙12+1)∙SCS1/2

BWgap is the bandwidth of the gap between the upper edge of the Transmission Bandwidth Configuration NRB1 of CC1 and the lower edge of the Transmisson Bandwidth Configuration NRB2 of CC2.

In contiguous CA, a non-contiguous RB allocation is a non-contiguous outer 1 RB allocation when it is not satisfying inner allocation conditions and when the following conditions are met:

RBStart,Low ≤ RBStart\_CA ≤ RBStart,High and NRB\_alloc ≤ ceil((3 BWChannel\_CA / 5 – BWgap) / 0.18MHz)

where

RBStart,Low = max(1, 2 ∙ NRB\_alloc – floor( (BWChannel\_CA – 2 ∙ BWgap + BWGB,low)/0.18MHz)),

RBStart,High = floor((2 ∙ BWChannel\_CA – 3 ∙ BWgap – BWGB,low) / 0.18MHz – 3 ∙ NRB\_alloc)

NRB\_alloc , RBStart\_CA , BWgap and BWGB,low are as defined for the Inner region.

In contiguous CA, a non-contiguous allocation is an Outer 2 allocation if it is neither a non-contiguous Inner allocation nor an Outer 1 allocation.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*End of changes 3 \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*Beginning of changes 4 \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

##### 6.2A.3.1.1 UE additional maximum output power reduction for Intra-band contiguous CA

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]*.* Relation between NR CA band and NR frequency band is specified in Table 5.2A.1-1.

To meet the additional requirements, additional maximum power reduction (A-MPR) is allowed for the maximum output power as specified in Table 6.2A.1.1-1. Unless stated otherwise, the total reduction to UE maximum output power is max(MPR, A-MPR) where MPR is defined in clause 6.2A.2.1. In absense of modulation and waveform types the A-MPR applies to all modulation and waveform types.

Table 6.2A.3.1.1-1 specifies the additional requirements with their associated network signalling values and the allowed A-MPR and applicable CA band(s) for each CA\_NS value. The CA\_NS\_xy value indicates the additional unwanted emissions requirements that apply for intra-band contiguous CA bands with NS\_xy indicated or configured in multiple uplink serving cells, except CA\_NS\_01 that indicates the general emission requirements for intra-band contiguous CA bands. The mapping of NR CA band numbers and values of the *additionalSpectrumEmission* to network signalling labels is specified in Table 6.2A.3.1.1-2. For any NR CA band not listed in Table 6.2A.3.1.1-2 the network signalling label CA\_NS\_01 applies.

Table 6.2A.3.1.1-1: Additional maximum power reduction (A-MPR)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Network signalling label | Requirements (clause) | NR CA Band | Aggregated channel bandwidth (MHz) | Resources blocks (*N*RB) | A-MPR (dB) |
| CA\_NS\_01 | 6.5A.2.2.1  6.5A.3.2.1 | Table 5.2A.1-1 | All applicable NR CA bands | All applicable NR CA configurations | N/A |
| CA\_NS\_04 | 6.5A.2.3.1.1  6.5A.3.3.1.1 | CA\_n41 | Table 5.5A.1-1 | 6.2A.3.1.1.1 | 6.2A.3.1.1.1 |
| CA\_NS\_27 | 6.5A.2.3.1.2  6.5A.3.3.1.2 | CA\_n48 | Table 5.5A.1-1 | 6.2A.3.1.1.2 | 6.2A.3.1.1.2 |
| CA\_NS\_46 | 6.5A.3.3.1.3 | CA\_n7 | Table 5.5A.1-1 | 6.2A.3.1.1.3 | 6.2A.3.1.1.3 |
| CA\_NS\_55, CA\_NS\_57 | See CA\_NS\_01 | CA\_n77 | Table 5.5A.1-1 | 6.2A.2.1 | See CA\_NS\_01 |

For UEs configured with intra-band contiguous CA in n77 and if NS\_01 is indicated for an uplink component carrier in the range 3450-3650 MHz and NS\_01 or NS\_57 for another uplink component carrier below 3980 MHz and partly or fully confined within the range 3650-3980 MHz, the allowed additional spurious emission and maximum output power reduction requirements are according to CA\_NS\_01.

Table 6.2A.3.1.1-2: Mapping of network signaling label

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR CA band | Value of additionalSpectrumEmission | | | | | | | |
|  | **0** | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
| CA\_n41 | CA\_NS\_01 | CA\_NS\_04 |  |  |  |  |  |  |
| CA\_n48 | CA\_NS\_01 | CA\_NS\_27 |  |  |  |  |  |  |
| CA\_n7 | CA\_NS\_01 | CA\_NS\_46 |  |  |  |  |  |  |
| CA\_n77 | CA\_NS\_01 | CA\_NS\_55 | CA\_NS\_57 |  |  |  |  |  |
| NOTE: *additionalSpectrumEmission* corresponds to an information element of the same name defined in clause 6.3.2 of TS 38.331 [7]. | | | | | | | | |

###### 6.2A.3.1.1.1 A-MPR for CA\_NS\_04

6.2A.3.1.1.1.1 Contiguous allocations

For all waveform type, modulations and scs when Fedge, low - BWChannel\_CA ≥ 2490.5 MHz, A-MPR = MPR

For all modulations and SCS when Fedge, low - BWChannel\_CA < 2490.5 MHz

if the RB allocation is an inner allocation as defined in clause 6.2A.2.1, then A-MPR = MPR

Except for RBstart ≤ 0.33\*BWchannel\_CA/0.18MHz, AMPR= max (MPR, AMPRcc).

if the RB allocation is an outer allocation as defined in clause 6.2A.2.1,

then for PC3 and PC2, A-MPR = MPR+1.5dB for BW Class B, A-MPR = MPR for BW class C. For PC1.5 BW Class C, A-MPR = MPR+1.5dB with MPR values in Table 6.2A.2.1-1c and Table 6.2A.2.1-1d for handheld UE and large FWA form factor respectively.

Where

- MPR is the MPR as defined in Table 6.2A.2.1-1 for PC3, Table 6.2A.2.1-1a and Table 6.2A.2.1-1b for PC2 and Table 6.2A.2.1-1c and Table 6.2A.2.1-1d for PC1.5 and the respective CA bandwidth class

- AMPRcc is defined as the PC3\_A2, PC2\_A4 or PC1.5 A6 AMPR in Table 6.2.3.2-2 for PC3, PC2 and PC1.5 respectively.

6.2A.3.1.1.1.2 Non-contiguous allocations

For intra-band contiguous CA\_n41B and CA\_n41C and it receives IE CA\_ NS\_04, the UE determines the allowed Additional Maximum Power Reduction (AMPR) for the maximum output power as specified in this clause. The AMPR is specified by AMPRIM3 to meet -25dBm/MHz when IM3 falls in -25dBm/MHz region of Table 6.5A.2.3.1.1-1 or Table 6.5A.3.3.1.1-1. And uses MPR for all other cases.

The UE determines the AMPR type as follows:

For all waveform types, modulations and SCS when Fedge, low - BWChannel\_CA ≥ 2490.5 MHz,

- if allocation is an inner or outer 1 allocation as defined in clause 6.2A.2.1 then A-MPR = MPR

- if allocation is an outer 2 allocation as defined in clause 6.2A.2.1 then A-MPR = MPR+1dB

For all waveform types, modulations and SCS when Fedge, low - BWChannel\_CA < 2490.5 MHz

If AND (MIN(FIM3,low\_block,high, SEM-13,low) < Ffilter,low , MAX( SEM-13,high, FIM3,high\_block,low ) > Ffilter,high )- if RB allocation is an inner or outer 1 allocation as defined in clause 6.2A.2.1 then A-MPR = MPR

- if RB allocation is an outer 2 allocation as defined in clause 6.2A.2.1 then A-MPR = MPR+1dB

Else

A-MPR = A-MPRIM3 defined in Clause 6.2A.3.1.1.1.3.

where

- MPR is the MPR as defined in Table 6.2A.2.1-2 for PC3, Table 6.2A.2.1-3 and Table 6.2A.2.1-4 for PC2 and PC2 2Tx respectively and the respective CA bandwidth class, and Table 6.2A.2.1-5 and Table 6.2A.2.1-5 for Class C PC1.5 2Tx and large FWA form factor PC1.5 2Tx respectively.

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

- [FIM3,low\_block,low =(2 \* Flow\_alloc,low\_edge ) – Fhigh\_alloc,high\_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.2.3.1.1

- 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.2.3.1.1

6.2A.3.1.1.1.3 AMPRIM3 to meet -25dBm/MHz

AMPR in this clause is for intra-band contiguous CA\_n41B and CA\_n41C. The allowed maximum output power reduction is defined as:

AMPRIM3=MA, Where MA is defined as follows for PC3

MA = 13; 0 ≤ B < 2.16

11.5; 2.16 ≤ B < 3.24

10.5; 3.24 ≤ B < 5.04

9.5; 5.04 ≤ B < 10.08

8; 10.08 ≤ B < 16.56

7; 16.56 ≤ B < 21.96

6; 21.96 ≤ B

AMPRIM3=MA, Where MA is defined as follows for 1Tx PC2 and MA is increased by 1dB for 2Tx PC2.

MA = 14; 0 ≤ B < 2.16

12.5; 2.16 ≤ B < 3.24

11.5; 3.24 ≤ B < 5.04

10.5; 5.04 ≤ B < 10.08

9; 10.08 ≤ B < 16.56

8; 16.56 ≤ B < 21.96

7; 21.96 ≤ B

AMPRIM3=MA, Where MA is defined as follows for hand-held 2Tx PC1.5 and MA is reduced by 0.5dB for large FWA form factor 2Tx PC1.5.

MA = 16.5; 0 ≤ B < 1.44

15.5; 1.44 ≤ B < 2.88

14.5; 2.88 ≤ B < 5.76

12.5; 5.76 ≤ B < 10.8

10.5; 10.8 ≤ B <23.04

10; 23.04 ≤ B]

Where:

B=(LCRB1\* 12\* SCS1 + LCRB2 \* 12 \* SCS2)/1,000 (MHz), where SCS1 and SCS2 are expressed in kHz.

and LCRB1, SCS1 are for CC1, LCRB2, SCS2 are for CC2, CC1 is the component carrier with lower frequency.

6.2A.3.1.1.2 A-MPR for CA\_NS\_27

6.2A.3.1.1.2.1 Contiguous allocations

For all modulations and scs when Fedge, low - BWChannel\_CA ≥ 3540 MHz AND Fedge, high + BWChannel\_CA ≤ 3710 MHz

if allocation is inner 1 then A-MPR = 0 dB where inner 1 is defined as

RBStart,Low = max(1, floor(LCRB/2))

where max() indicates the largest value of all arguments and floor(x) is the greatest integer less than or equal to x.

RBStart,High = NRB\_agg – RBStart,Low – LCRB

with following conditions

RBStart,Low ≤ RBStart ≤ RBStart,High,and

LCRB ≤ ceil(NRB\_agg /2)

AMPR = 5 dB for some exeptions for inner 1 region. These exceptions are defined when LCRB < 8 any of the following conditions are met:

RBstart ≤ 30 or RBend ≥ 164 for BWChannel\_CA = 40MHz or

for the subset of frequencies that satisfy 3540 MHz + BWChannel\_CA ≤ Fedge, low < 3530 MHz + 2\*BWChannel\_CA, the following exception thresholds apply

for BWChannel\_CA = 35MHz threshold of RBstart ≤ 25, and

for BWChannel\_CA = 30MHz threshold of RBstart ≤ 19, and

for BWChannel\_CA = 25MHz threshold of RBstart ≤ 14, and

for BWChannel\_CA = 20MHz threshold of RBstart ≤ 9, and

for BWChannel\_CA = 15MHz threshold of RBstart ≤ 3

or for the subset of frequencies that satisfy 3720 MHz – 2\*BWChannel\_CA < Fedge, high ≤ 3710 MHz – BWChannel\_CA, the following exception thresholds apply

for BWChannel\_CA = 35MHz threshold of RBend ≥ 144, and

for BWChannel\_CA = 30MHz threshold of RBend ≥ 124, and

for BWChannel\_CA = 25MHz threshold of RBend ≥ 104, and

for BWChannel\_CA = 20MHz threshold of RBend ≥ 80, and

for BWChannel\_CA = 15MHz threshold of RBend ≥ 68,

else for non-inner 1 allocations A-MPR= 5 dB when Fedge, low - BWChannel\_CA ≥ 3540 MHz AND Fedge, high + BWChannel\_CA ≤ 3710 MHz

For all modulations and scs when 3550 MHz ≤ Fedge, low < 3540 MHz + BWChannel\_CA

if allocation is inner 3 then A-MPR = 0 dB, where inner 3 is defined as

NRB\_agg /4 < RBStart < NRB\_agg 3/4 − LCRB AND LCRB < NRB\_agg/4

Inner 3 region exceptions thresholds are

for BWChannel\_CA = 40MHz threshold of RBstart ≤ 63, and

for BWChannel\_CA = 35MHz threshold of RBstart ≤ 52, and

for BWChannel\_CA = 30MHz threshold of RBstart ≤ 42, and

For which AMPR = 11.5dB

else for non-inner 3 allocations when BWagg ≤ 20 MHz, A-MPR = 7 dB or when BWagg > 20 MHz, A-MPR = 11.5dB when 3550 MHz ≤ Fedge, low < 3540 MHz + BWChannel\_CA.

For all modulations and scs when 3710 MHz - BWChannel\_CA < Fedge, high ≤ 3700

if allocation is inner 3 then A-MPR = 0 dB.

Inner 3 region exceptions thresholds are

for BWChannel\_CA = 40MHz threshold of RBend ≥ 132, and

for BWChannel\_CA = 35MHz threshold of RBend ≥ 121, and

for BWChannel\_CA = 30MHz threshold of RBend ≥ 110, and

For which AMPR 11.5dB

else for non-inner 3 allocation when BWagg ≤ 20 MHz, A-MPR = 7 dB or when BWagg > 20 MHz, A-MPR = 11.5dB when 3710 MHz - BWChannel\_CA < Fedge, high ≤ 3700..

6.2A.3.1.1.2.2 Non-contiguous allocations

For all modulations and scs when Fedge, low - BWChannel\_CA ≥ 3540 MHz AND Fedge, high + BWChannel\_CA ≤ 3710 MHz

A-MPR=

13; 0 ≤B<1.08

12; 1.08 ≤B<2.16

11; 2.16 ≤B<3.24

10.5; 3.24 ≤ B < 5.04

9.5; 5.04≤B< 10.08

8; 10.08 ≤B< 16.56

7; 16.56 ≤ B < 21.96

6.5; 21.96 ≤B

For all modulations and scs when 3550 MHz ≤ Fedge, low < 3540 MHz + BWChannel\_CA or 3710 MHz - BWChannel\_CA < Fedge, high ≤ 3700

when BWChannel\_CA ≤ 20 MHz

A-MPR=

13; 0 ≤B<1.08

12; 1.08 ≤B<2.16

11; 2.16 ≤B<3.24

10.5; 3.24 ≤ B < 5.04

9.5; 5.04 ≤B< 10.08

8; 10.08 ≤B< 16.56

7; 16.56 ≤ B < 21.96

6.5; 21.96 ≤B

or when BWChannel\_CA > 20 MHz

A-MPR =

20; 0 ≤B<1.08

19.5; 1.08 ≤B<2.16

19; 2.16 ≤B<3.24

18.5; 3.24 ≤ B < 5.04

18; 5.04 ≤B< 10.08

17; 10.08 ≤B< 16.56

16; 16.56 ≤ B < 21.96

13; 21.96 ≤B.

Where:

B = (LCRB1\* 12\* SCS1 + LCRB2 \* 12 \* SCS2)/1,000 (MHz), where SCS1 and SCS2 are expressed in kHz.

and LCRB1, SCS1 are for CC1, LCRB2, SCS2 are for CC2, CC1 is the component carrier with lower frequency.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*End of changes 4 \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*Beginning of changes 5 \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

##### 6.2A.4.1.1 Configured transmitted power for Intra-band contiguous CA

For uplink carrier aggregation the UE is allowed to set its configured maximum output power PCMAX,*c* for serving cell *c* and its total configured maximum output power PCMAX.

The configured maximum output power PCMAX,*c* on serving cell *c* shall be set as specified in clause 6.2.4, but with MPR*c* = MPR and A-MPR*c* = A-MPR with MPR and A-MPR as determined by subclause 6.2A.2 and 6.2A.3, respectively. For PH reporting the following exception applies: if the UE is configured with multiple uplink serving cells, the power PCMAX,*c* used for the purpose of PH reporting on first serving cell *c* = *c*1 does not consider for computation of the PH report transmissions on a second serving cell *c*2 as exempted in subclause 7.7.1 in [8]. There is one power management term for the UE, denoted P-MPR, and P-MPR*c* = P-MPR.

The total configured maximum output power PCMAX shall be set within the following bounds:

PCMAX\_L ≤ PCMAX ≤ PCMAX\_H

For uplink intra-band contiguous carrier aggregation when same slot pattern is used in all aggregated serving cells,

PCMAX\_L  = MIN{10 log10 ∑ pEMAX,c  - TC , PEMAX,CA,(PPowerClass,CA– ΔPPowerClass,CA) – MAX(MAX(MPR, A-MPR) + ΔTIB,c + TC + TRxSRS, P-MPRc ) }

PCMAX\_H  = MIN{10 log10 ∑ pEMAX,c , PEMAX,CA ,PPowerClass,CA– ΔPPowerClass,CA }

where

- pEMAX,c is the linear value of PEMAX,*c* which is given by IE *P-Max* for serving cell *c* in [7];

PPowerClass,CA is the maximum UE power specified in Table 6.2A.1.1-1 without taking into account the tolerance;

- MPR and A-MPR are specified in clause 6.2A.2 and 6.2A.3, respectively;

- ΔPPowerClass,CA = 3 dB for a power class 2 or 6 dB for a power class 1.5 UE when the requirements of default power class are applied as specified in sub-clause 6.2.A.1.1; otherwise ΔPPowerClass,CA = 0 dB;

NOTE: UE reports ∆PPowerClass,CA when *deltaPowerClassReporting-r18* is present, dpc-Reporting-FR1 [7] is configured and the reporting is triggered only by uplink duty cycle exceedance or by return to the *powerClass* after the duty cycle exceedance.

- TIB,c is the additional tolerance for serving cell *c* as specified in clause 6.2A.4.2 for NR CA, clause 6.2C.2 for SUL, or TS 38.101-3 clause 6.2B.4.2 for EN-DC; In case the UE supports more than one of band combinations for CA, SUL or DC, and an operating band belongs to more than one band combinations then

a) When the operating band frequency range is ≤ 1 GHz, the applicable additional ∆TIB,c shall be the average value for all band combinations defined in clause 6.2A.4.2, 6.2C.2 in this specification and 6.2B.4.2 in TS 38.101-3 [3], truncated to one decimal place that apply for that operating band among the supported band combinations. In case there is a harmonic relation between low band UL and high band DL, then the maximum ∆TIB,c among the different supported band combinations involving such band shall be applied

b) When the operating band frequency range is > 1 GHz, the applicable additional ∆TIB,c shall be the maximum value for all band combinations defined in clause 6.2A.4.2, 6.2C.2 in this specification and 6.2B.4.2 in TS 38.101-3 [3] for the applicable operating bands.

- P-MPR is the power management term for the UE;

- TC is the highest value TC,c among all serving cells *c*;

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

- PEMAX,CA is the value indicated by *p-NR-FR1* or by *p-UE-FR1* whichever is the smallest if both are present*.*

For uplink intra-band contiguous carrier aggregation, when at least one different numerology/slot pattern is used in aggregated cells, the UE is allowed to set its configured maximum output power PCMAX,c(i),i for serving cell c(i) of slot numerology type *i*, and its total configured maximum output power PCMAX.

The configured maximum output power PCMAX,c(i),i (p) in slot p of serving cell c(i) on slot numerology type *i* shall be set within the following bounds:

PCMAX\_L,f,c(i),i (p) ≤ PCMAX,f,c(i), i (p) ≤ PCMAX\_H,f,c(i),i (p)

where PCMAX\_L,f,c (i),i (p) and PCMAX\_H,f,c(i),i (p) are the limits for a serving cell c(i) of slot numerology type i as specified in clause 6.2.4.

The total UE configured maximum output power PCMAX (p,q) in a slot p of slot numerology or symbol pattern *i*, and a slot q of slot numerology or symbol pattern *j* that overlap in time shall be set within the following bounds unless stated otherwise:

PCMAX\_L(p,q) ≤ PCMAX (p,q) ≤ PCMAX\_H (p,q)

When slots p and q have different transmissions lengths and belong to different cells on different or same bands:

PCMAX\_L (p,q) = MIN {10 log10 [pCMAX\_L,f,c(i),i (p) + pCMAX\_L,f,c(i),j (q)], PPowerClass,CA, PEMAX,CA}

PCMAX\_H (p,q) = MIN {10 log10 [pCMAX\_ H,f,c(i),i (p) + pCMAX\_ H,f,c(i),j (q)], PPowerClass,CA, PEMAX,CA}

where pCMAX\_L,f,c (i),i and pCMAX\_ H,f,c(i),i are the respective limits PCMAX\_L,f,c (i),i and PCMAX\_H,f,c(i),i expressed in linear scale.

TREF and Teval are specified in Table 6.2A.4.1.1-0 when same and different slot patterns are used in aggregated carriers. For each TREF, the PCMAX\_L is evaluated per Teval and given by the minimum value taken over the transmission(s) within the Teval; the minimum PCMAX\_L over the one or more Teval is then applied for the entire TREF. The lesser of PPowerClass,CA and PEMAX,CA shall not be exceeded by the UE during any period of time.

Table 6.2A.4.1.1-0: PCMAX evaluation window for different slot and channel durations

|  |  |  |
| --- | --- | --- |
| TREF | Teval | Teval with frequency hopping |
| TREF of largest slot duration over both UL CCs | Physical channel length | Min(Tno\_hopping, Physical Channel Length) |

If the UE is configured with multiple TAGs and transmissions of the UE on slot *i* for any serving cell in one TAG overlap some portion of the first symbol of the transmission on slot *i* +1 for a different serving cell in another TAG, the UE minimum of PCMAX\_L for slots *i* and *i* + 1 applies for any overlapping portion of slots *i* and *i* + 1. The lesser of PPowerClass,CA and PEMAX,CA shall not be exceeded by the UE during any period of time.

The measured maximum output power PUMAX over all serving cells with same slot pattern shall be within the following range:

PCMAX\_L – MAX{TL, TLOW(PCMAX\_L) } ≤ PUMAX  ≤ PCMAX\_H + THIGH(PCMAX\_H)

PUMAX = 10 log10 ∑ pUMAX,c

where pUMAX,c denotes the measured maximum output power for serving cell *c* expressed in linear scale. The tolerances TLOW(PCMAX) and THIGH(PCMAX) for applicable values of PCMAX are specified in Table 6.2A.4.1.1-1. The tolerance TL is the absolute value of the lower tolerance for applicable NR CA configuration as specified in Table 6.2A.1.1-1 for intra-band carrier aggregation.

The measured maximum output power PUMAX over all serving cells, when at least one slot has a different transmission numerology or slot pattern, shall be within the following range:

P'CMAX\_L– MAX{TL, TLOW (P'CMAX\_L)} ≤ P'UMAX  ≤ P'CMAX\_H + THIGH (P'CMAX\_H)

P'UMAX = 10 log10 ∑ p'UMAX,c

where p'UMAX,c denotes the average measured maximum output power for serving cell *c* expressed in linear scale over TREF. The tolerances TLOW(P'CMAX) and THIGH(P'CMAX) for applicable values of P'CMAX are specified in Table 6.2A.4.1.1-1 for intra-band carrier aggregation. The tolerance TL is the absolute value of the lower tolerance for applicable NR CA configuration as specified in Table 6.2A.1.1-1 for intra-band carrier aggregation.

where:

P'CMAX\_L  = MIN{ MIN {10log10∑( pCMAX\_L,f,c(i),i), PPowerClass,CA} over all overlapping slots in TREF}

P'CMAX\_H = MAX{ MIN{10 log10 ∑ pEMAX,c , PPowerClass,CA} over all overlapping slots in TREF}

Table 6.2A.4.1.1-1: PCMAX tolerance for uplink intra-band contiguous CA

|  |  |  |
| --- | --- | --- |
| PCMAX (dBm) | Tolerance TLOW(PCMAX) (dB) | Tolerance THIGH(PCMAX) (dB) |
| 23 < PCMAX ≤ 29 | 3 | 2 |
| 21 ≤ PCMAX ≤ 23 | 2.0 | |
| 20 ≤ PCMAX < 21 | 2.5 | |
| 19 ≤ PCMAX < 20 | 3.5 | |
| 18 ≤ PCMAX < 19 | 4.0 | |
| 13 ≤ PCMAX < 18 | 5.0 | |
| 8 ≤ PCMAX < 13 | 6.0 | |
| -40 ≤ PCMAX < 8 | 7.0 | |

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*End of changes 5 \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*Beginning of changes 6 \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

## 6.2H Transmitter power for CA with UL MIMO

### 6.2H.1 Transmitter power for intra-band UL contiguous CA with UL MIMO

#### 6.2H.1.1 UE maximum output power for intra-band UL contiguous CA with UL MIMO

For intra-band UL contiguous CA and UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the maximum output power is defined as the sum of the maximum output power from both UE antenna connectors and all UL CCs. The period of measurement shall be at least one sub frame (1 ms), as specified in Table 6.2H.1.1-1. The requirements shall be met with the UL MIMO configurations specified in Table 6.2D.1-2 for 2 layer configuration and the PUSCH configurations specified in Table 6.2D.1-3 for ULFPTx configuration.

Table 6.2H.1.1-1: UE Power Class for intra-band UL contiguous CA with UL MIMO in closed loop spatial multiplexing scheme

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR CA Configuration | Class 1.5 (dBm) | Tolerance (dB) | Class 2 (dBm) | Tolerance (dB) | Class 3 (dBm) | Tolerance (dB) | Class 5 (dBm) | Tolerance (dB) |
| CA\_n41C | 29 | +2/-3 | 26 | +2/-3 | 23 | +2/-3 |  |  |
| CA\_n77C | 29 | +2/-3 | 26 | +2/-3 | 23 | +2/-3 |  |  |
| CA\_n78C | 29 | +2/-3 | 26 | +2/-3 | 23 | +2/-3 |  |  |
| CA\_n79C | 29 | +2/-3 | 26 | +2/-3 | 23 | +2/-3 |  |  |
| NOTE 1: An uplink CA configuration in which the band has NOTE 3 in Table 6.2.1-1 is allowed to reduce the lower tolerance limit by 1.5 dB when the transmission bandwidths of the band are confined within FUL\_low and FUL\_low + 4 MHz or FUL\_high - 4 MHz and FUL\_high.  NOTE 2: PPowerClass is the maximum UE power specified without taking into account the tolerance. | | | | | | | | |

If UE is scheduled for single antenna-port PUSCH transmission by DCI format 0\_0 or by DCI format 0\_1 for single antenna port codebook based transmission with precoding matrix *W*=1 [6.3.1.5 TS 38.211], the requirements in clause 6.2A.1.1 apply for at least one antenna connector for the power class as indicated by the *ue-PowerClass* field in capability signalling.

#### 6.2H.1.2 UE maximum output power reduction for intra-band UL contiguous CA with UL MIMO

For intra-band UL contiguous CA and UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2H.1.1-1 is specified in Table 6.2A.2.1-1 and Table 6.2A.2.1-2 for power class 3 CA; Table 6.2A.2.1-1b and Table 6.2A.2.1-4 for power class 2 CA; Table 6.2A.2.1-1c, 6.2A.2.1-1d, Table 6.2A.2.1-5 and Table 6.2A.2.1-6 for power class 1.5 CA.

The requirements shall be met with UL MIMO configurations defined in Table 6.2D.1-2 for 2 layer configuration and the PUSCH configurations specified in Table 6.2D.1-3 for ULFPTx configuration. For the UE maximum output power modified by MPR, the power limits specified in clause 6.2H.1.4 apply.

If UE is scheduled for single antenna-port PUSCH transmission by DCI format 0\_0 or by DCI format 0\_1 for single antenna port codebook based transmission with precoding matrix *W*=1 [6.3.1.5 TS 38.211], the requirements in clause 6.2A.2.1 apply for the power class as indicated by the *ue-PowerClass* field in capability signaling.

#### 6.2H.1.3 UE additional maximum output power reduction for intra-band UL contiguous CA with UL MIMO

For intra-band UL contiguous CA and UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the A-MPR values specified in clause 6.2A.3.1.1 shall apply to the maximum output power specified in Table 6.2H.1.1-1. The requirements shall be met with UL MIMO configurations defined in Table 6.2D.1-2 for 2 layer configuration and the PUSCH configurations specified in Table 6.2D.1-3 for ULFPTx configuration.

For the UE maximum output power modified by A-MPR, the power limits specified in clause 6.2H.1.4 apply.

If UE is scheduled for single antenna-port PUSCH transmission by DCI format 0\_0 or by DCI format 0\_1 for single antenna port codebook based transmission with precoding matrix *W*=1 [6.3.1.5 TS 38.211], the requirements in clause 6.2A.3.1.1 apply for the power class as indicated by the *ue-PowerClass* field in capability signaling.

#### 6.2H.1.4 Configured transmitted power for intra-band UL contiguous CA with UL MIMO

For UE supporting intra-band UL contiguous CA with UL MIMO, the transmitted power is configured per each UE.

The definitions of configured maximum output power PCMAX,*c*, the lower bound PCMAX\_L,*c*, and the higher bound PCMAX\_H,*c* specified in clause 6.2A.4.1.1 shall apply to UE supporting intra-band UL contiguous CA with UL MIMO, where

- ΔPPowerClass,CA and ∆TC,c are specified in clause 6.2A.4.1.1 unless otherwise stated;

- PPowerClass,CA is the maximum UE power specified in Table 6.2H.1.1-1 without taking into account the tolerance;

- MPR, AMPR is specified in clause 6.2H.1.2 and 6.2H.1.3;

The measured configured maximum output power PUMAX over all serving cells shall be within the following bounds:

PCMAX\_L – MAX{TL, T LOW(PCMAX\_L)} ≤ PUMAX  ≤ PCMAX\_H + T HIGH(PCMAX\_H)

where TLOW(PCMAX\_L) and THIGH(PCMAX\_H) are defined as the tolerance and applies to PCMAX\_L and PCMAX\_H separately, while TL is the absolute value of the lower tolerance in Table 6.2H.1.1-1 for the applicable operating band.

For UE supporting intra-band UL contiguous CA with UL MIMO, the tolerance is specified in Table 6.2H.1.4-1.

Table 6.2H.1.4-1: PCMAX tolerance for intra-band UL contiguous CA with UL MIMO

|  |  |  |
| --- | --- | --- |
| PCMAX (dBm) | Tolerance TLOW(PCMAX\_L) (dB) | Tolerance THIGH(PCMAX\_H) (dB) |
| 23 ≤ PCMAX ≤ 29 | 3.0 | 2.0 |
| 22 ≤ PCMAX < 23 | 5.0 | 2.0 |
| 21 ≤ PCMAX < 22 | 5.0 | 3.0 |
| 20 ≤ PCMAX < 21 | 5.0 | 4.0 |
| 16 ≤ PCMAX < 20 | 5.0 | |
| 11 ≤ PCMAX < 16 | 6.0 | |
| -40 ≤ PCMAX < 11 | 7.0 | |

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*End of changes 6 \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*Beginning of changes 7 \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

6.5A.2.4.1.1 NR ACLR for intra-band contiguous CA

For intra-band contiguous carrier aggregation, the carrier aggregation the Adjacent Channel Leakage power Ratio is the ratio of the filtered mean power centred on the aggregated channel bandwidth to the filtered mean power centred on an adjacent aggregated channel bandwidth at nominal channel spacing. The assigned aggregated channel bandwidth power and adjacent aggregated channel bandwidth power are measured with rectangular filters with measurement bandwidths specified in Table 6.5A.2.4.1.1-1 for power class 3 and 6.5A.2.4.1.1-2 for power class 2 and power class 1.5. If the measured adjacent channel power is greater than –50dBm then the NRACLR shall be higher than the value specified in Table 6.5A.2.4.1.1-1 for power class 3 and 6.5A.2.4.1.1-2 for power class 2 and power class 1.5.

Table 6.5A.2.4.1.1-1: General requirements for intra-band contiguous CA ACLR power class 3

|  |  |
| --- | --- |
|  | ACLR / Measurement bandwidth |
| CA ACLR | 30 dB |
| CA Measurement bandwidth  (NOTE 1) | Nominal channel space+MBWACLR,low/2+ MBWACLR,high/2 |
| Adjacent channel centre frequency offset (in MHz) | + BWChannel\_CA  /  - BWChannel\_CA |
| Difference between ACLR MBW center and Fc,low | MBWshift= (MBWACLR\_CA-MBWACLR,low)/2 |
| NOTE 1: MBWACLR,low and MBWACLR,high are the single-channel ACLR measurement bandwidths specified for channel bandwidths BWchannel(low) and BWchannel(high) in 6.5.2.4.1, respectively. | |

Table 6.5A.2.4.1.1-2: General requirements for intra-band contiguous CA ACLR power class 2 and power class 1.5

|  |  |
| --- | --- |
|  | ACLR / Measurement bandwidth |
| CA ACLR | 31 dB |
| CA Measurement bandwidth  (NOTE 1) | Nominal channel space+MBWACLR,low/2+ MBWACLR,high/2 |
| Adjacent channel centre frequency offset (in MHz) | + BWChannel\_CA  /  - BWChannel\_CA |
| Difference between ACLR MBW center and Fc,low | MBWshift= (MBWACLR\_CA-MBWACLR,low)/2 |
| NOTE 1: MBWACLR,low and MBWACLR,high are the single-channel ACLR measurement bandwidths specified for channel bandwidths BWchannel(low) and BWchannel(high) in 6.5.2.4.1, respectively. | |

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*End of changes 7 \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*