**3GPP TSG-RAN WG5 Meeting # *draftR5-215386r1***

**Electronic Meeting, August 16 – August 27, 2021**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  |  | **CR** | **1150** | **rev** |  | **Current version:** |  |  |
|  |
| *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 |  | Radio Access Network |  | Core Network |  |

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| --- |
|  |
| ***Title:***  | Update of cl 6.2B.1.3 for RF |
|  |  |
| ***Source to WG:*** | CMCC, Qualcomm, Ericsson |
| ***Source to TSG:*** | R5 |
|  |  |
| ***Work item code:*** | 5GS\_NR\_LTE-UEConTest |  | ***Date:*** | 2021-08-17 |
|  |  |  |  |  |
| ***Category:*** |  |  | ***Release:*** | Rel-17 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe 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:*** | cl 6.2B.1.3 for RF need to be updated to address Option 4. |
|  |  |
| ***Summary of change:*** | cl 6.2B.1.3 for RF has been updated. |
|  |  |
| ***Consequences if not approved:*** | The WP can not be completed. |
|  |  |
| ***Clauses affected:*** | 6.2B.1.3 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

<<< START OF CHANGES >>>

#### **6.2B.1.3 UE Maximum Output Power for Inter-Band MR-DC within FR1**

6.2B.1.3.1 Test purpose

To verify that the error of the UE maximum output power does not exceed the range prescribed by the specified nominal maximum output power and tolerance.

An excess maximum output power has the possibility to interfere to other channels or other systems. A small maximum output power decreases the coverage area.

6.2B.1.3.2 Test applicability

This test applies to all types of E-UTRA UE release 15 and forward, supporting inter-band EN-DC or NE-DC operating on FR1.

6.2B.1.3.3 Minimum conformance requirements for EN-DC

For inter-band EN-DC of E-UTRA and NR in FR1, the following UE Power Classes define the maximum output power for any transmission bandwidth within the aggregated channel bandwidth. The maximum output power is measured as the sum of the maximum output power at each UE antenna connector. The period of measurement shall be at least one sub frame (1ms). UE maximum output power shall be measured over all component carriers from different bands. If each band has separate antenna connectors, maximum output power is measured as the sum of maximum output power at each UE antenna connector.

Table 6.2B.1.3.3-1: Maximum output power for inter-band EN-DC (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| EN-DC configuration | Power class 2(dBm) | Tolerance(dB) | Power class 3(dBm) | Tolerance(dB) |
| DC\_1A\_n3A |  |  | 23 | +2/-3 |
| DC\_1A\_n28A |  |  | 23 | +2/-3 |
| DC\_1A\_n40A |  |  | 23 | +2/-3 |
| DC\_1A\_n51A |  |  | 23 | +2/-3 |
| DC\_1A\_n77A |  |  | 23 | +2/-3 |
| DC\_1A\_n78ADC\_1A\_n84A\_ULSUP-TDM\_n78ADC\_1A\_n84A\_ULSUP-FDM\_n78A |  |  | 23 | +2/-3 |
| DC\_1A\_n79A |  |  | 23 | +2/-3 |
| DC\_2A\_n5A |  |  | 23 | +2/-31 |
| DC\_2A\_n41A |  |  | 23 | +2/-3 |
| DC\_2A\_n66A |  |  | 23 | +2/-31 |
| DC\_2A\_n71A |  |  | 23 | +2/-3 |
| DC\_2A\_n78A |  |  | 23 | +2/-3 |
| DC\_3A\_n7A |  |  | 23 | +2/-31 |
| DC\_3A\_n28A |  |  | 23 | +2/-31 |
| DC\_3A\_n40A |  |  | 23 | +2/-31 |
| DC\_3A\_n41A,DC\_3C\_n41A | 266 | +2/-3 | 23 | +2/-3 |
| DC\_3A\_n51A |  |  | 23 | +2/-31 |
| DC\_3A\_n77A |  |  | 23 | +2/-31 |
| DC\_3A\_n78A | 266 | +2/-31 | 23 | +2/-31 |
| DC\_3A\_n79ADC\_3A\_n80A\_ULSUP-TDM\_n79A,DC\_3A\_n80A\_ULSUP-FDM\_n79A |  |  | 23 | +2/-31 |
| DC\_3A\_n82A |  |  | 23 | +2/-31 |
| DC\_5A\_n2A |  |  | 23 | +2/-3 |
| DC\_5A\_n40A |  |  | 23 | +2/-31 |
| DC\_5A\_n66A |  |  | 23 | +2/-31 |
| DC\_5A\_n78A |  |  | 23 | +2/-3 |
| DC\_7A\_n1A |  |  | 23 | +2/-3 |
| DC\_7A\_n3A |  |  | 23 | +2/-3 |
| DC\_7A\_n28A |  |  | 23 | +2/-31 |
| DC\_7A\_n51A |  |  | 23 | +2/-31 |
| DC\_7A\_n66A |  |  | 23 | +2/-31 |
| DC\_7A\_n78ADC\_7C\_n78A |  |  | 23 | +2/-3 |
| DC\_8A\_n1A |  |  | 23 | +2/-3 |
| DC\_8A\_n3A |  |  | 23 | +2/-3 |
| DC\_8A\_n40A |  |  | 23 | +2/-31 |
| DC\_8A\_n41A,DC\_8A\_n81A\_ULSUP-TDM,DC\_8A\_n81A\_ULSUP-FDM |  |  | 23 | +2/-3 |
| DC\_8A\_n77A |  |  | 23 | +2/-3 |
| DC\_8A\_n78ADC\_8A\_n81A\_ULSUP-TDM\_n78A,DC\_8A\_n81A\_ULSUP-FDM\_n78A |  |  | 23 | +2/-3 |
| DC\_8A\_n79ADC\_8A\_n81A\_ULSUP-TDM\_n79A,DC\_8A\_n81A\_ULSUP-FDM\_n79A |  |  | 23 | +2/-3 |
| DC\_11A\_n77A |  |  | 23 | +2/-3 |
| DC\_11A\_n78A |  |  | 23 | +2/-3 |
| DC\_11A\_n79A |  |  | 23 | +2/-3 |
| DC\_12A\_n5A |  |  | 23 | +2/-3 |
| DC\_12A\_n66A |  |  | 23 | +2/-3 |
| DC\_12A\_n78A |  |  | 23 | +2/-3 |
| DC\_13A\_n2A |  |  | 23 | +2/-3 |
| DC\_13A\_n66A |  |  | 23 | +2/-3 |
| DC\_14A\_n2A |  |  | 23 | +2/-3 |
| DC\_14A\_n66A |  |  | 23 | +2/-3 |
| DC\_18A\_n77A |  |  | 23 | +2/-3 |
| DC\_18A\_n78A |  |  | 23 | +2/-3 |
| DC\_18A\_n79A |  |  | 23 | +2/-3 |
| DC\_19A\_n77A |  |  | 23 | +2/-3 |
| DC\_19A\_n78A |  |  | 23 | +2/-3 |
| DC\_19A\_n79A |  |  | 23 | +2/-3 |
| DC\_20A\_n1A |  |  | 23 | +2/-3 |
| DC\_20A\_n3A |  |  | 23 | +2/-3 |
| DC\_20A\_n8A |  |  | 23 | +2/-3 |
| DC\_20A\_n28ADC\_20A\_n83A |  |  | 23 | +2/-3 |
| DC\_20A\_n51A |  |  | 23 | +2/-3 |
| DC\_20A\_n77A |  |  | 23 | +2/-3 |
| DC\_20A\_n78ADC\_20A\_n82A\_ULSUP-TDM\_n78A,DC\_20A\_n82A\_ULSUP-FDM\_n78A |  |  | 23 | +2/-3 |
| DC\_21A\_n77A |  |  | 23 | +2/-3 |
| DC\_21A\_n78A |  |  | 23 | +2/-3 |
| DC\_21A\_n79A |  |  | 23 | +2/-3 |
| DC\_25A\_n41A |  |  | 23 | +2/-3 |
| DC\_26A\_n41A |  |  | 23 | +2/-3 |
| DC\_26A\_n77A |  |  | 23 | +2/-3 |
| DC\_26A\_n78A |  |  | 23 | +2/-3 |
| DC\_26A\_n79A |  |  | 23 | +2/-3 |
| DC\_28A\_n3A |  |  | 23 | +2/-3 |
| DC\_28A n51A |  |  | 23 | +2/-3 |
| DC\_28A\_n77A |  |  | 23 | +2/-3 |
| DC\_28A\_n78ADC\_28A\_n83A\_ULSUP-TDM\_n78A,DC\_28A\_n83A\_ULSUP-FDM\_n78A |  |  | 23 | +2/-3 |
| DC\_28A\_n79A |  |  | 23 | +2/-3 |
| DC\_30A\_n5A |  |  | 23 | +2/-3 |
| DC\_30A\_n66A |  |  | 23 | +2/-3 |
| DC\_38A\_n78A |  |  | N/A | N/A |
| DC\_39A\_n41A | 26 | +2/-31 | 23 | +2/-2 |
| DC\_39A\_n78A |  |  | 23 | +2/-31 |
| DC\_39A\_n79A | 26 | +2/-3 | 23 | +2/-31 |
| DC\_40A\_n1A |  |  | 23 | +2/-3 |
| DC\_40A\_n41A |  |  | 23 | +2/-3 |
| DC\_40A\_n77A |  |  | N/A | N/A |
| DC\_40A\_n78A |  |  | 23 | +2/-3 |
| DC\_41A\_n77ADC\_41C\_n77A |  |  | 23 | +2/-31 |
| DC\_41A\_n78ADC\_41C\_n78A |  |  | 23 | +2/-31 |
| DC\_41A\_n79ADC\_41C\_n79A | 26 | +2/-31 | 23 | +2/-31 |
| DC\_42A\_n51A |  |  | 23 | +2/-3 |
| DC\_42A\_n77A |  |  | N/A | N/A |
| DC\_42A\_n78A |  |  | N/A | N/A |
| DC\_42A\_n79A |  |  | N/A | N/A |
| DC\_48A\_n5A |  |  | 23 | +2/-3 |
| DC\_48A\_n66A |  |  | 23 | +2/-3 |
| DC\_66A\_n2A |  |  | 23 | +2/-3 |
| DC\_66A\_n5A |  |  | 23 | +2/-31 |
| DC\_66A\_n41A |  |  | 23 | +2/-3 |
| DC\_66A\_n71A |  |  | 23 | +2/-3 |
| DC\_66A\_n78A, DC\_66A\_n86A\_ULSUP-TDM\_n78A,DC\_66A\_n86A\_ULSUP-FDM\_n78A |  |  | 23 | +2/-3 |
| NOTE 1: For 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 2: PPowerClass, EN-DC is the maximum UE power specified without taking into account the tolerance.NOTE 3: For inter-band EN-DC the maximum power requirement should 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: The UE is not required to support PC2 within each individual cell group. Power class support within each individual cell group is signaled separately by the UE.NOTE 6: The UE supports PC3 within E-UTRA cell group, and supports either PC3 or PC2 within NR cell group. Power class support within each individual cell group is signaled separately by the UE. |

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

– if the field of UE capability *maxUplinkDutyCycle-EN-DC* is absent and the percentage of NR uplink symbols transmitted in a certain evaluation period is larger than 30% (The exact evaluation period is no less than one radio frame); or

– if the field of UE capability *maxUplinkDutyCycle-EN-DC* is not absent and the percentage of NR uplink symbols transmitted in a certain evaluation period is larger than *maxUplinkDutyCycle-EN-DC* as defined in TS38.331 (The exact evaluation period is no less than one radio frame); or

– if the IE *p-maxUE-FR1* as defined in TS 38.331 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 clause 6.2B.4;

– Else if the IE *p-maxUE-FR1* as defined in TS 38.331 is not provided or set to the higher value than the maximum output power of the default power class and the percentage of uplink symbols transmitted in a certain evaluation period is less than or equal t*o maxUplinkDutyCycle-EN-DC* as defined in TS 38.331; or

– if the IE *p-maxUE-FR1* as defined in TS 38.331 is not provided or set to the higher value than the maximum output power of the default power class and the percentage of NR uplink symbols transmitted in a certain evaluation period is less than or equal to 30% when *maxUplinkDutyCycle-EN-DC* is absent. (The exact evaluation period is no less than one radio frame):

– shall apply all requirements for the supported power class and set the configured transmitted power class as specified in clause 6.2B.4.

If a UE supports a different power class than the default UE power class for an E-UTRA FDD and NR TDD EN-DC band combination and the supported power class enables higher maximum output power than that of the default power class:

If UE indicating the two capabilities *maxUplinkDutyCycle-FDD-TDD-EN-DC1* and *maxUplinkDutyCycle-FDD-TDD-EN-DC2*:

* if the IE *p-maxUE-FR1* as defined in TS 38.331 is not provided or set to the higher value than the maximum output power of the default power class, and the percentage of EUTRA uplink symbols transmitted in a certain evaluation period is between 40% and 70%, and the percentage of NR uplink symbols transmitted in a certain evaluation period is less than or equal t*o maxUplinkDutyCycle-FDD-TDD-EN-DC1* as defined in TS 38.331 (The exact evaluation period is no less than one radio frame); or

– if the IE *p-maxUE-FR1* as defined in TS 38.331 is not provided or set to the higher value than the maximum output power of the default power class, and the percentage of EUTRA uplink symbols transmitted in a certain evaluation period is no larger than 40%, and the percentage of NR uplink symbols transmitted in a certain evaluation period is less than or equal t*o maxUplinkDutyCycle-FDD-TDD-EN-DC2* as defined in TS 38.331 (The exact evaluation period is no less than one radio frame)

– shall apply all requirements for the supported power class and set the configured transmitted power class as specified in sub-clause 6.2B.4.

– else

– shall apply all requirements for the default power class and set the configured transmitted power as specified sub-clause 6.2B.4;

else

– shall apply all requirements for the supported power class and set the configured transmitted power as specified sub-clause 6.2B.4;

The normative reference for this requirement is TS 38.101-3 [4] clause 6.2B.1.

Anchor agnostic approach is not applied. E-UTRA test point analysis is included and E-UTRA measurements are performed.

6.2B.1.3.3a Minimum conformance requirements for NE-DC

For inter-band NE-DC of E-UTRA and NR in FR1, the following UE power classes define the maximum output power for any transmission bandwidth within the aggregated channel bandwidth. The maximum output power is measured as the sum of the maximum output power at each UE antenna connector. The period of measurement shall be at least one sub frame (1 ms). UE maximum output power shall be measured over all component carriers from different bands. If each band has separate antenna connectors, maximum output power is measured as the sum of maximum output power at each UE antenna connector.

Table 6.2B.1.3.3a-1: Maximum output power for inter-band NE-DC (two bands)

| NE-DC configuration | Power class 3(dBm) | Tolerance(dB) |
| --- | --- | --- |
| DC\_n1A\_28A | 23 | +2/-3 |
| DC\_n78A\_1A | 23 | +2/-3 |
| DC\_n78A\_3A | 23 | +2/-3 |
| DC\_n78A\_5A | 23 | +2/-3 |
| DC\_n78A\_7A | 23 | +2/-3 |
| DC\_n78A\_8A | 23 | +2/-3 |
| DC\_n78A\_26A | 23 | +2/-3 |

The normative reference for this requirement is TS 38.101-3 [4] clause 6.2B.1.3a.

6.2B.1.3.4 Test description

6.2B.1.3.4.1 Initial condition

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

The initial test configurations consist of environmental conditions, test frequencies, DC configuration specified in clause 5.5B.4 and test channel bandwidths specified in TS 36.508 [11] clause 4.3.1 and TS 38.508-1 [6] clause 4.3.1, and sub-carrier spacing based on NR operating bands specified in TS 38.521-1 [8] clause 5.3. All of these configurations shall be tested with applicable test parameters for each MR-DC configuration, and are shown in table 6.2B.1.3.4.1-1. The details of the uplink reference measurement channels (RMCs) are specified in TS 36.521-1 [10] Annexe A, clause A.2.3 for E-UTRA RMC for TDD, TS 36.521-1 [10] Annex A, clause A.2.2 for E-UTRA RMC for FDD, and TS 38.521-1 [8] Annex A, clause A.2 for NR RMC. Configurations of PDSCH and PDCCH before measurement are specified in TS 36.521-1 [10] Annex C, clause C.2 and in TS 38.521-1 [8] Annex C, clause C.2 for E-UTRA CG and NR CG respectively.

Table 6.2B.1.3.4.1-1: Test configuration table

|  |
| --- |
| Default Conditions |
| Test Environmentas specified in TS 38.508-1 [6] clause 4.1 | Normal, TL/VL, TL/VH, TH/VL, TH/VH |
| Test Frequenciesas specified in TS 38.508-1 [6] clause 4.3.1 and TS 36.508 [6] | Low range for E-UTRA CC1 and NR CC1,Mid range for E-UTRA CC1 and NR CC1,High range for E-UTRA CC1 and NR CC1 (NOTE 4) |
| Test MR-DC channel bandwidth as specified in TS 36.508 [6] clause 4.3.1 and TS 38.508-1 clause 4.3.1 | 5MHz for E-UTRA CC1 and Lowest for NR CC1,Highest for E-UTRA CC1 and Highest for NR CC1 |
| Test SCS for the NR cell as specified in TS 38.521-1 [8] Table 5.3.5-1 | Lowest, Highest |
| Test Parameters |
| Test ID | Test Freq | E-UTRABW | NR BW | Downlink Configuration | MR-DC Uplink Configuration |
| E-UTRA Cell | NR Cell |
| Modulation | RB allocation (NOTE 1) | Modulation (NOTE 3) | RB allocation(NOTE 2) |
| 1 | High | Default | Default | N/A | QPSK | 1RB\_Right | DFT-s-OFDM PI/2 BPSK | Inner\_1RB\_Right |
| 2 | Low | Default | Default | QPSK | 1RB\_Left | DFT-s-OFDM PI/2 BPSK | Inner\_1RB\_Left |
| 3 | Default | Default | Default | QPSK | Partial\_Allocation | DFT-s-OFDM PI/2 BPSK | Inner\_Full |
| 4 | High | Default | Default | QPSK | 1RB\_Right | DFT-s-OFDM QPSK | Inner\_1RB\_Right |
| 5 | Low | Default | Default | QPSK | 1RB\_Left | DFT-s-OFDM QPSK | Inner\_1RB\_Left |
| 6 | Default | Default | Default | QPSK | Partial\_Allocation | DFT-s-OFDM QPSK | Inner\_Full |
| 7 | High | 5MHz, Highest | Lowest | QPSK | 1RB\_Right | N/A | N/A |
| 8 | Low | 5MHz, Highest | Lowest | QPSK | 1RB\_Left | N/A | N/A |
| 9 | Default | 5MHz, Highest | Lowest | QPSK | Partial\_Allocation | N/A | N/A |
| 10 | High | 5MHz | Lowest, Highest | N/A | N/A | DFT-s-OFDM PI/2 BPSK | Inner\_1RB\_Right |
| 11 | Low | 5MHz | Lowest, Highest | N/A | N/A | DFT-s-OFDM PI/2 BPSK | Inner\_1RB\_Left |
| 12 | Default | 5MHz | Lowest, Highest | N/A | N/A | DFT-s-OFDM PI/2 BPSK | Inner\_Full |
| 13 | High | 5MHz | Lowest, Highest | N/A | N/A | DFT-s-OFDM QPSK | Inner\_1RB\_Right |
| 14 | Low | 5MHz | Lowest, Highest | N/A | N/A | DFT-s-OFDM QPSK | Inner\_1RB\_Left |
| 15 | Default | 5MHz | Lowest, Highest | N/A | N/A | DFT-s-OFDM QPSK | Inner\_Full |
| NOTE 1: The specific configuration of each RB allocation is defined in Table 6.1-1 in current specification.NOTE 2: The specific configuration of each RB allocation is defined in Table 6.1-1 in TS 38.521-1 [8].NOTE 3: DFT-s-OFDM Pi/2 BPSK test applies only for UEs which supports Pi/2 BPSK in NR FR1.NOTE 4: For NR band n28, 30MHz test channel bandwidth is tested with Low range and High range test frequencies. |

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [6] clause A.3.1.1 for SS and clause A.3.2.1 for UE.

2. The parameter settings for the cell are set up according to TS 38.508-1 [6] clause 4.4.3.

3. Downlink signals are initially set up according to TS 36.521-1 [10] Annex C.0 and TS 38.521-1 [8] Annex C.0 for E-UTRA CG and NR CG respectively, and uplink signals according to TS 36.521-1 [10] Annex H and TS 38.521-1 [8] Annex G for E-UTRA CG and NR CG respectively.

4. The UL Reference Measurement channels are TS 36.521-1 [10] Annex A.2 and TS 38.521-1 [8] Annex A.2 for E-UTRA CG and NR CG respectively.

5. Propagation conditions are set according to TS 36.521-1 [10] and TS 38.521-1 [8] Annex B.0 for E-UTRA CG and NR CG respectively.

As per guidance in clause 4.5.1

If UE supports EN-DC then

6. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.2B.1.3.4.3.

Else if UE does not support EN-DC then

6. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity NE-DC, DC bearer *MCG* and *SCG*, Connected without release *On* according to TS 38.508-1 [6] clause 4.5. Message contents are defined in clause 6.2B.1.3.4.3a.

7. For the case of testing overlapping E-UTRA and NR UL transmission scenario when both bands are TDD, ensure E-UTRA UL transmission overlaps with NR UL transmission in time by giving SCG a delay of 3 E-UTRA subframes, or by giving MCG a delay of 2 subframes.

6.2B.1.3.4.2 Test procedure

1. SS sends uplink scheduling information for each UL HARQ process via PDCCH DCI format 0 and DCI format 0\_1 for C\_RNTI to schedule the UL RMC according to table 6.2B.1.3.4.1-1 on E-UTRA CC and NR CC respectively. Since the UL has no payload and no loopback data to send the UE sends uplink MAC padding bits on the UL RMC. For an E-UTRA FDD and NR TDD MR-DC band combination, if UE supports PC2, the percentage of EUTRA uplink symbols transmitted in each radio frame shall be less than 40%.

2. Send continuously uplink power control "up" commands to the UE for NR and E-UTRA carrier according to table 6.2B.1.3.4.1-1 until the UE transmits at its PUMAX level; allow at least 200 ms from the first TPC command for the UE to reach PUMAX level.

3. For test ID 1~6 measure the sum of mean transmitted power over all MR-DC component carriers in the MR-DC, which shall meet the requirements described in table 6.2B.1.3.5-1 and the period of the measurement shall be at least the continuous duration of one active sub-frame.

 For test ID 7~15 measure the mean transmitted power over E-UTRA carrier or NR carrier, which shall meet the requirements described in table 6.2.2.5-1 in TS 36.521-1 [10] or table 6.2.1.5-1 in TS 38.521-1 [8] respectively. The period of the measurement shall be at least the continuous duration of one active sub-frame.

4. For UEs supporting Power Class 2, repeat steps 1~3 on the applicable bands with message exception defined in Table 6.2B.1.3.4.3-5.

6.2B.1.3.4.3 Message contents for EN-DC

Message contents are according to TS 36.508 [11] clause 4.6.1 and TS 38.508-1 [6] clause 4.6.1 with the following exceptions.

Table 6.2B.1.3.4.3-0: *PUSCH-Config*

|  |
| --- |
| Derivation Path: TS 38.508-1 [6], Table 4.6.3-118 with condition TRANSFORM\_PRECODER\_ENABLED |

Table 6.2B.1.3.4.3-1: PhysicalCellGroupConfig

|  |
| --- |
| Derivation Path: TS 38.508-1 [6], Table 4.6.3-106 |
| Information Element | Value/remark | Comment | Condition |
| PhysicalCellGroupConfig ::= SEQUENCE { |  |  |  |
|  p-NR-FR1 | 20 | For simultaneous E-UTRA and NR transmission | Power Class 3 UETest IDs 1-6 |
|  | 23 | For Test IDs 7~9 NR carrier is configured but not measured. | Power Class 3 UETest IDs 7-15 |
|  | 23 | For simultaneous E-UTRA and NR transmission | Power Class 2 UETest IDs 1-6 |
|  | 26 | For Test IDs 7~9 NR carrier is configured but not measured. | Power Class 2 UE Test IDs 7-15 |
| } |  |  |  |

Table 6.2B.1.3.4.3-2: *RRCConnectionReconfiguration:* nr-Config-r15

|  |
| --- |
| Derivation Path: TS 36.508 [11], Table 4.6.1-8 |
| Information Element | Value/remark | Comment | Condition |
|  p-MaxEUTRA-r15 | 20 | For simultaneous E-UTRA and NR transmission | Power Class 3 UETest IDs 1-6 |
|  | 23 | For Test IDs 10~15 E-UTRA carrier is configured but not measured. | Power Class 3 UETest IDs 7-15 |
|  | 23 | For simultaneous E-UTRA and NR transmission | Power Class 2 UETest IDs 1-6 |
|  | 26 | For Test IDs 10~15 E-UTRA carrier is configured but not measured. | Power Class 2 UETest IDs 7-15 |

Table 6.2B.1.3.4.3-3: *RRCConnectionReconfiguration:* tdm-PatternConfig if E-UTRA on FDD band and UE does not support dynamic power sharing

|  |
| --- |
| Derivation Path: TS 36.508 [11], Table 4.6.1-8 |
| Information Element | Value/remark | Comment | Condition |
|  tdm-PatternConfig-r15 CHOICE{ |  |  | Test IDs 7-15 |
|  setup SEQUENCE { |  |  |  |
|  subframeAssignment-r15 | sa2 |  |  |
|  harq-Offset-r15 | 0 |  |  |
|  } |  |  |  |
|  } |  |  |  |

Table 6.2B.1.3.4.3-4: *SystemInfomationBlockType1:* tdd-Config if E-UTRA on TDD band

|  |
| --- |
| Derivation Path: TS 36.508 [11], Table 4.6.3-23 |
| Information Element | Value/remark | Comment | Condition |
| TDD-Config-DEFAULT ::= SEQUENCE { |  | Operating on TDD band |  |
|  subframeAssignment | sa2 |  |  |
|  specialSubframePatterns | ssp7 |  |  |
| } |  |  |  |

Table 6.2B.1.3.4.3-5: *RRCConnectionReconfiguration:* p-MaxUE-FR1-r15 (step 4 in 6.2B.1.3.4.2)

|  |
| --- |
| Derivation Path: TS 36.508 [11], Table 4.6.1-8 |
| Information Element | Value/remark | Comment | Condition |
|  nonCriticalExtension SEQUENCE { |  | RRCConnectionReconfiguration-v1530-IEs |  |
|  p-MaxUE-FR1-r15 | 23 |  | Power Class 2 UE |
|  } |  |  |  |

6.2B.1.3.4.3a Message contents for NE-DC

FFS

6.2B.1.3.5 Test requirements

For test ID 1~6 the maximum output power for the DC configuration, derived in step 3 shall be within the range prescribed by the UE Power Class and tolerance in Table 6.2B.1.3.5-1 for EN-DC and Table 6.2B.1.3.5-1a for NE-DC.

For test ID 7~15 the maximum output power for the DC configuration, derived in step 3 shall be within the range prescribed by the UE Power Class and tolerance in table 6.2.2.5-1 in TS 36.521-1 [10] or table 6.2.1.5-1 in TS 38.521-1 [8] for E-UTRA carier and NR carrier respectively for Power class 3, and in Table 6.2B.1.3.5-2a for Power class 2.

For test ID 1~6 the maximum output power for the DC configuration, derived in step 4 shall be within the range prescribed by Power Class 3 and tolerance in Table 6.2B.1.3.5-1.

For test ID 7~15 the maximum output power for the DC configuration, derived in step 4 shall be within the range prescribed by Power Class 3 and tolerance in table 6.2.2.5-1 in TS 36.521-1 [10] or table 6.2.1.5-1 in TS 38.521-1 [8] for E-UTRA carier and NR carrier respectively.

Table 6.2B.1.3.5-1: Maximum output power for inter-band EN-DC (two bands), for overlapping UL transmission

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| EN-DC configuration | Power class 2(dBm) | Tolerance(dB) | Power class 3(dBm) | Tolerance(dB) |
| DC\_1A\_n3A |  |  | 23 | +2 +TT/-3-TT |
| DC\_1A\_n28A |  |  | 23 | +2 +TT/-3-TT |
| DC\_1A\_n40A |  |  | 23 | +2 +TT/-3-TT |
| DC\_1A\_n51A |  |  | 23 | +2 +TT/-3-TT |
| DC\_1A\_n77A |  |  | 23 | +2 +TT/-3-TT |
| DC\_1A\_n78ADC\_1A\_n84A\_ULSUP-TDM\_n78ADC\_1A\_n84A\_ULSUP-FDM\_n78A |  |  | 23 | +2 +TT/-3-TT |
| DC\_1A\_n79A |  |  | 23 | +2 +TT/-3-TT |
| DC\_2A\_n5A |  |  | 23 | +2 +TT/-3-TT3 |
| DC\_2A\_n41A |  |  | 23 | +2 +TT/-3-TT |
| DC\_2A\_n66A |  |  | 23 | +2 +TT/-3-TT3 |
| DC\_2A\_n71A |  |  | 23 | +2 +TT/-3-TT |
| DC\_2A\_n78A |  |  | 23 | +2 +TT/-3-TT |
| DC\_3A\_n7A |  |  | 23 | +2 +TT/-3-TT3 |
| DC\_3A\_n28A |  |  | 23 | +2 +TT/-3-TT3 |
| DC\_3A\_n40A |  |  | 23 | +2 +TT/-3-TT3 |
| DC\_3A\_n41A,DC\_3C\_n41A | 268 | +2+TT/-3-TT3 | 23 | +2+TT/-3-TT3 |
| DC\_3A\_n51A |  |  | 23 | +2 +TT/-3-TT3 |
| DC\_3A\_n77A |  |  | 23 | +2 +TT/-3-TT3 |
| DC\_3A\_n78A | 268 | +2+TT/-3-TT3 | 23 | +2 +TT/-3-TT3 |
| DC\_3A\_n79ADC\_3A\_n80A\_ULSUP-TDM\_n79A,DC\_3A\_n80A\_ULSUP-FDM\_n79A |  |  | 23 | +2 +TT/-3-TT3 |
| DC\_3A\_n82A |  |  | 23 | +2 +TT/-3-TT3 |
| DC\_5A\_n2A |  |  | 23 | +2 +TT/-3-TT |
| DC\_5A\_n40A |  |  | 23 | +2 +TT/-3-TT3 |
| DC\_5A\_n66A |  |  | 23 | +2 +TT/-3-TT3 |
| DC\_5A\_n78A |  |  | 23 | +2 +TT/-3-TT |
| DC\_7A\_n1A |  |  | 23 | +2 +TT/-3-TT |
| DC\_7A\_n3A |  |  | 23 | +2 +TT/-3-TT |
| DC\_7A\_n28A |  |  | 23 | +2 +TT/-3-TT3 |
| DC\_7A\_n51A |  |  | 23 | +2 +TT/-3-TT3 |
| DC\_7A\_n66A |  |  | 23 | +2 +TT/-3-TT3 |
| DC\_7A\_n78ADC\_7C\_n78A |  |  | 23 | +2 +TT/-3-TT |
| DC\_8A\_n1A |  |  |  | +2 +TT/-3-TT |
| DC\_8A\_n3A |  |  |  | +2 +TT/-3-TT |
| DC\_8A\_n40A |  |  | 23 | +2 +TT/-3-TT3 |
| DC\_8A\_n41A,DC\_8A\_n81A\_ULSUP-TDM,DC\_8A\_n81A\_ULSUP-FDM |  |  | 23 | +2 +TT/-3-TT |
| DC\_8A\_n77A |  |  | 23 | +2 +TT/-3-TT |
| DC\_8A\_n78ADC\_8A\_n81A\_ULSUP-TDM\_n78A,DC\_8A\_n81A\_ULSUP-FDM\_n78A |  |  | 23 | +2 +TT/-3-TT |
| DC\_8A\_n79ADC\_8A\_n81A\_ULSUP-TDM\_n79A,DC\_8A\_n81A\_ULSUP-FDM\_n79A |  |  | 23 | +2 +TT/-3-TT |
| DC\_11A\_n77A |  |  | 23 | +2 +TT/-3-TT |
| DC\_11A\_n78A |  |  | 23 | +2 +TT/-3-TT |
| DC\_11A\_n79A |  |  | 23 | +2 +TT/-3-TT |
| DC\_12A\_n5A |  |  | 23 | +2 +TT/-3-TT |
| DC\_12A\_n66A |  |  | 23 | +2 +TT/-3-TT |
| DC\_12A\_n78A |  |  | 23 | +2 +TT/-3-TT |
| DC\_13A\_n2A |  |  | 23 | +2 +TT/-3-TT |
| DC\_13A\_n66A |  |  | 23 | +2 +TT/-3-TT |
| DC\_14A\_n2A |  |  | 23 | +2 +TT/-3-TT |
| DC\_14A\_n66A |  |  | 23 | +2 +TT/-3-TT |
| DC\_18A\_n77A |  |  | 23 | +2 +TT/-3-TT |
| DC\_18A\_n78A |  |  | 23 | +2 +TT/-3-TT |
| DC\_18A\_n79A |  |  | 23 | +2 +TT/-3-TT |
| DC\_19A\_n77A |  |  | 23 | +2 +TT/-3-TT |
| DC\_19A\_n78A |  |  | 23 | +2 +TT/-3-TT |
| DC\_19A\_n79A |  |  | 23 | +2 +TT/-3-TT |
| DC\_20A\_n1A |  |  | 23 | +2 +TT/-3-TT |
| DC\_20A\_n3A |  |  | 23 | +2 +TT/-3-TT |
| DC\_20A\_n8A |  |  | 23 | +2 +TT/-3-TT |
| DC\_20A\_n28ADC\_20A\_n83A |  |  | 23 | +2 +TT/-3-TT |
| DC\_20A\_n51A |  |  | 23 | +2 +TT/-3-TT |
| DC\_20A\_n77A |  |  | 23 | +2 +TT/-3-TT |
| DC\_20A\_n78ADC\_20A\_n82A\_ULSUP-TDM\_n78A,DC\_20A\_n82A\_ULSUP-FDM\_n78A |  |  | 23 | +2 +TT/-3-TT |
| DC\_21A\_n77A |  |  | 23 | +2 +TT/-3-TT |
| DC\_21A\_n78A |  |  | 23 | +2 +TT/-3-TT |
| DC\_21A\_n79A |  |  | 23 | +2 +TT/-3-TT |
| DC\_25A\_n41A |  |  | 23 | +2 +TT/-3-TT |
| DC\_26A\_n41A |  |  | 23 | +2 +TT/-3-TT |
| DC\_26A\_n77A |  |  | 23 | +2 +TT/-3-TT |
| DC\_26A\_n78A |  |  | 23 | +2 +TT/-3-TT |
| DC\_26A\_n79A |  |  | 23 | +2 +TT/-3-TT |
| DC\_28A n3A |  |  | 23 | +2 +TT/-3-TT |
| DC\_28A n51A |  |  | 23 | +2 +TT/-3-TT |
| DC\_28A\_n77A |  |  | 23 | +2 +TT/-3-TT |
| DC\_28A\_n78ADC\_28A\_n83A\_ULSUP-TDM\_n78A,DC\_28A\_n83A\_ULSUP-FDM\_n78A |  |  | 23 | +2 +TT/-3-TT |
| DC\_28A\_n79A |  |  | 23 | +2 +TT/-3-TT |
| DC\_30A\_n5A |  |  | 23 | +2 +TT/-3-TT |
| DC\_30A\_n66A |  |  | 23 | +2 +TT/-3-TT |
| DC\_38A\_n78A |  |  | N/A | N/A |
| DC\_39A\_n41A | 26 | +2/-31 | 23 | +2 +TT/-3-TT3 |
| DC\_39A\_n78A |  |  | 23 | +2 +TT/-3-TT3 |
| DC\_39A\_n79A | 26 | +2/-3 | 23 | +2 +TT/-3-TT3 |
| DC\_40A\_n1A |  |  | 23 | +2 +TT/-3-TT |
| DC\_40A\_n41A |  |  | 23 | +2 +TT/-3-TT |
| DC\_40A\_n77A |  |  | N/A | N/A |
| DC\_40A\_n78A |  |  | 23 | +2 +TT/-3-TT |
| DC\_41A\_n77ADC\_41C\_n77A |  |  | 23 | +2 +TT/-3-TT3 |
| DC\_41A\_n78ADC\_41C\_n78A |  |  | 23 | +2 +TT/-3-TT3 |
| DC\_41A\_n79ADC\_41C\_n79A | 26 | +2/-31 | 23 | +2 +TT/-3-TT3 |
| DC\_42A\_n51A |  |  | 23 | +2 +TT/-3-TT |
| DC\_42A\_n77A |  |  | N/A | N/A |
| DC\_42A\_n78A |  |  | N/A | N/A |
| DC\_42A\_n79A |  |  | N/A | N/A |
| DC\_48A\_n5A |  |  | 23 | +2 +TT/-3-TT |
| DC\_48A\_n66A |  |  | 23 | +2 +TT/-3-TT |
| DC\_66A\_n2A |  |  | 23 | +2 +TT/-3-TT |
| DC\_66A\_n5A |  |  | 23 | +2 +TT/-3-TT3 |
| DC\_66A\_n41A |  |  | 23 | +2 +TT/-3-TT |
| DC\_66A\_n71A |  |  | 23 | +2 +TT/-3-TT |
| DC\_66A\_n78A, DC\_66A\_n86A\_ULSUP-TDM\_n78A,DC\_66A\_n86A\_ULSUP-FDM\_n78A |  |  | 23 | +2 +TT/-3-TT |
| NOTE 1: TT applies to output power in each UL carrier with E-UTRA UL transmission not overlapping with NR UL transmission in time, and its value is the same as TT of standalone E-UTRA or NR transmission. For detailed values refer to Table 6.2B.1.3.5-2.NOTE 2: TT applies to overall output power with E-UTRA UL transmission overlapping with NR UL transmission in time, and its value is the maximum TT among all E-UTRA and NR UL carriers. For detailed values refer to Table 6.2B.1.3.5-3.NOTE 3: For 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: PPowerClass, MR-DC is the maximum UE power specified without taking into account the tolerance.NOTE 5: For inter-band MR-DC the maximum power requirement should apply to the total transmitted power over all component carriers (per UE).NOTE 6: Power Class 3 is the default power class unless otherwise stated.NOTE 7: The UE is not required to support PC2 within each individual cell group. Power class support within each individual cell group is signaled separately by the UE.NOTE 8: The UE supports PC3 within E-UTRA cell group, and supports either PC3 or PC2 within NR cell group. Power class support within each individual cell group is signaled separately by the UE. |

Table 6.2B.1.3.5-1a: Maximum output power for inter-band NE-DC (two bands), for overlapping UL transmission

| NE-DC configuration | Power class 3(dBm) | Tolerance(dB) |
| --- | --- | --- |
| DC\_n1A\_28A | 23 | +2+TT/-3-TT |
| DC\_n78A\_1A | 23 | +2+TT/-3-TT |
| DC\_n78A\_3A | 23 | +2+TT/-3-TT |
| DC\_n78A\_5A | 23 | +2+TT/-3-TT |
| DC\_n78A\_7A | 23 | +2+TT/-3-TT |
| DC\_n78A\_8A | 23 | +2+TT/-3-TT |
| DC\_n78A\_26A | 23 | +2+TT/-3-TT |

Table 6.2B.1.3.5-2: Void

Table 6.2B.1.3.5-2a: Maximum output power for inter-band EN-DC (two bands), for non-overlapping UL transmission for power class 2 (Rel-16 and forward)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| EN-DC configuration | Carrier | Power class 2(dBm) | Tolerance(dB) | Condition | Comment |
| DC\_3A\_n41A | NR carrier | 26 | +2+TT/-32-TT | UE reporting (PC2 by PPowerClass,NR, and PC2 or Not present by *powerClassNRPart-r16*) | UE meets power class 2 requirements |
|  |  | 23 | +2+TT/-22-TT | UE reporting (PC2 by PPowerClass,NR, and PC3 by *powerClassNRPart-r16*) or UE reporting (PC3 by PPowerClass,NR) | UE meets power class 3 requirements |
|  | E-UTRA carrier | 23 | +2+TT/-22-TT | UE indicates PC3 on E-UTRA band | UE meets power class 3 requirements |
| DC\_3A\_n78A | NR carrier | 26 | +2+TT/-3-TT | UE reporting (PC2 by PPowerClass,NR, and PC2 or Not present by *powerClassNRPart-r16*) | UE meets power class 2 requirements |
|  |  | 23 | +2+TT/-3-TT | UE reporting (PC2 by PPowerClass,NR, and PC3 by *powerClassNRPart-r16*) or UE reporting (PC3 by PPowerClass,NR) | UE meets power class 3 requirements |
|  | E-UTRA carrier | 23 | +2+TT/-22-TT | UE indicates PC3 on E-UTRA band | UE meets power class 3 requirements |
| DC\_39A\_n41A | NR carrier | 26 | +2+TT/-32-TT | UE reporting (PC2 by PPowerClass,NR, and PC2 or Not present by *powerClassNRPart-r16*) | UE meets power class 2 requirements |
|  |  | 23 | +2+TT/-22-TT | UE reporting (PC2 by PPowerClass,NR, and PC3 by *powerClassNRPart-r16*) or UE reporting (PC3 by PPowerClass,NR) | UE meets power class 3 requirements |
|  | E-UTRA carrier | 23 | +2+TT/-22-TT | UE indicates PC3 on E-UTRA band | UE meets power class 3 requirements |
| DC\_39A\_n79A | NR carrier | 26 | +2+TT/-3-TT | UE reporting (PC2 by PPowerClass,NR, and PC2 or Not present by *powerClassNRPart-r16*) | UE meets power class 2 requirements |
|  |  | 23 | +2+TT/-3-TT | UE reporting (PC2 by PPowerClass,NR, and PC3 by *powerClassNRPart-r16*) or UE reporting (PC3 by PPowerClass,NR) | UE meets power class 3 requirements |
|  | E-UTRA carrier | 23 | +2+TT/-22-TT | UE indicates PC3 on E-UTRA band | UE meets power class 3 requirements |
| DC\_41A\_n79ADC\_41C\_n79A | NR carrier | 26 | +2+TT/-3-TT | UE reporting (PC2 by PPowerClass,NR, and PC2 or Not present by *powerClassNRPart-r16*) | UE meets power class 2 requirements |
|  |  | 23 | +2+TT/-3-TT | UE reporting (PC2 by PPowerClass,NR, and PC3 by *powerClassNRPart-r16*) or UE reporting (PC3 by PPowerClass,NR) | UE meets power class 3 requirements |
|  | E-UTRA carrier | 26 | +2+TT/-22-TT | UE indicates PC2 on E-UTRA band | UE meets power class 2 requirements |
|  |  | 23 | +2+TT/-22-TT | UE indicates PC3 on E-UTRA band | UE meets power class 3 requirements |
| NOTE 1: TT applies to output power in each UL carrier with E-UTRA UL transmission not overlapping with NR UL transmission in time, and its value is the same as TT of standalone E-UTRA or NR transmission. For detailed values refer to Table 6.2B.1.3.5-3.NOTE 2: For 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 3: PPowerClass, EN-DC is the maximum UE power specified without taking into account the tolerance. |

Table 6.2B.1.3.5-3: Test Tolerance for UE maximum output power (Overlapping UL transmission)

|  |
| --- |
| TT for overall output power |
|  |  |  | NR |
|  |  |  | BW ≤ 20MHz | 20 MHz < BW ≤ 40MHz | 40MHz < BW ≤ 100MHz |
|  |  |  | f ≤ 3.0GHz  | 3.0GHz < f ≤ 4.2GHz | 4.2GHz < f ≤ 6.0GHz | f ≤ 3.0GHz  | 3.0GHz < f ≤ 4.2GHz | 4.2GHz < f ≤ 6.0GHz | f ≤ 3.0GHz  | 3.0GHz < f ≤ 4.2GHz | 4.2GHz < f ≤ 6.0GHz |
| E-UTRA | BW ≤ 20MHz | f ≤ 3.0GHz | 0.7 dB | 1.0 dB | 1.0 dB | 0.7 dB | 1.0 dB | 1.0 dB | 1.0 dB | 1.0 dB | 1.0 dB |
| 3.0GHz < f ≤ 4.2GHz | 1.0 dB | 1.0 dB | 1.0 dB | 1.0 dB | 1.0 dB | 1.0 dB | 1.0 dB | 1.0 dB | 1.0 dB |

<< END OF CHANGES >>